


*Lock and Whitfield. Photo.*

*Woodburytype.*

GEORGE IBBETSON, F.R.C.S., L.D.S., ENG.



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# Odontological Society of Great Britain.

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## ORDINARY MONTHLY MEETING.

*Monday, November 3rd, 1884.*

J. S. TURNER, M.R.C.S., L.D.S.Eng.,  
PRESIDENT, IN THE CHAIR.

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THE Minutes of the previous meeting having been read and confirmed,

THE PRESIDENT announced that the following gentlemen had been duly nominated as candidates for election, and would be balloted for at a subsequent meeting, viz.:

MESSRS. JOHN ALEXANDER FOTHERGILL, M.R.C.S. &  
L.D.S.Eng., D.D.S. Univ. Pennsylvania,  
Northgate, Darlington.  
JOHN BROOKS BRIDGMAN, L.D.S.I., St. Giles'  
Street, Norwich.

The following candidates were then balloted for and elected non-resident Members of the Society:—

MESSRS. ARTHUR BAINES, L.D.S.I., Lichfield House,  
Hanley;  
STEPHEN MUNDELL, L.D.S.Eng., 8, Mulgrave  
Place, Plymouth; and  
ARTHUR PELLANT, L.D.S.I., Maidenhead.

THE PRESIDENT then called upon the Curator of the Museum to announce any donations which he had received since the last meeting.

MR. HUTCHINSON said he had only two donations to bring before the Society. He had received from Mr. Coleman, just before his departure, a specimen of the swivel and spring used by Mr. Rogers of Hanover Square, and he could himself strongly commend them to the notice of members. He knew of a patient who had worn them for fifteen years without any repairs having been required.

The other specimen was a model, sent by Mr. Lyddon of Reading, showing transposition of the left lower canine. The patient was a young man, aged twenty-three, and the tooth was situated to the right of the median line in front of the right central.

MR. WEISS reported that several additions had been made to the Library during the recess. Sir Edwin Saunders had offered a collection of fourteen volumes, but as ten of these were already in the Library, only four were accepted. These were—

“The Natural History of Human Teeth,” by Joseph Murphy; 1811.

“On the Teeth of the Horse,” by T. Irwin Ganly; 1829.

“On the Age of the Ox, Sheep, and Pig,” by J. B. Simonds; 1854.

Three Short “Treatises on the Teeth,” by A. F. Talma, J. M. A. Schange, and C. F. Delabarre, in French, bound in one volume; published in 1842–3.

The following donations had also been received:—

“Removal of Tumours,” by C. F. Maunder; 1874.

“On Taking Impressions of the Mouth,” by J. W. White, Philadelphia; 1871.

“The Student’s Guide to Dental Anatomy and Surgery,” by Henry Sewill.

“Dental Caries,” by Henry Sewill.

“The Journal of Anatomy and Physiology.”

“The Transactions of the Royal Society.”

“The Transactions of the Royal Dublin Society.”

“The Quarterly Journal of Microscopical Science.”

“The Annual Report of the Smithsonian Institution.”

MR. MORTON SMALE showed models of a case in which there was congenital absence of both temporary and permanent lower incisors. The patient was a boy, and the models were taken at the age of nine years and twelve years respectively. In the upper jaw the permanent laterals were absent. The rest of the family presented nothing peculiar as regards their dentition.

He also showed models of the mouth of a female patient, aged twenty-five, in whom all the permanent incisors, both upper and lower, were absent. In this case the father had the same deficiency, but out of several children only this one daughter resembled him in this respect.

MR. ARTHUR UNDERWOOD said he had then under his care a case which puzzled him, and with regard to which he should be glad to obtain the advice of those present. His patient was a middle-aged gentleman, who had a very fair set of teeth, all healthy, but a good deal worn. The only teeth which troubled him were an upper and lower molar; these were much worn, the enamel covering the cusps being gone, and the dentine exposed. The teeth were, however, completely insensitive except at one spot in each tooth; but here there was most acute sensibility. The sensitive spot occupied precisely the same situation in each tooth, being confined to a very minute point of what had been the anterior external cusp. Exposure either to heat or cold gave intense pain. There could be no doubt but that a small filament of the pulp was exposed, though he could not detect any evident signs of this, even by careful examination through a magnifying glass.

The question was as to the best way of dealing with such a case. He had first tried the application of strong carbolic acid, but this did no good. He then applied chloride of zinc. This caused intense pain for a few moments, but after two or three applications the sensitiveness was greatly diminished, and eventually he dismissed the patient in a decidedly hopeful frame of mind. But at the end of a week he returned, saying that he had been pretty comfortable for



a few days after the application, but that then the sensitiveness returned as acutely as before. Mr. Underwood again used the zinc chloride, with the effect of giving temporary relief, but he should be glad to hear of some more effectual and lasting method of treatment.

He would add, with reference to the explanation he had suggested, that it was not very uncommon to meet with cases in which prolongations from the pulp were found in unexpected proximity to the surface of a tooth. Thus in a case he had seen at the Dental Hospital, a filament of the pulp of a bicuspid tooth extended quite to the surface of the dentine, and exposure of the pulp resulted from the mere accidental chipping off of a small fragment of enamel.

MR. WALTER COFFIN remarked that in looking at a section of a tooth made through the horns of the pulp under the microscope it was very difficult to tell exactly where the pulp tissue ended, and it had often appeared to him that it approached a good deal nearer to the surface than was generally supposed.

MR. D. HEPBURN said he had noticed that the most common situation for an exposure of the pulp in molars was just the part which Mr. Underwood found so sensitive in this case, viz., the anterior external cusp. Of the sensitiveness of the pulp, even when not exposed, he had had a remarkable ocular demonstration in the case of a patient with unusual transparency of the teeth caused by attrition, resulting from an edge to edge bite. The outline of the pulp cavities of the incisors could be distinctly seen, and in the case of one of the canines, though it might sound almost incredible, he could actually see the nerve retract when an instrument was passed over the surface of the tooth.

MR. W. A. HUNT said he had met with a case somewhat similar to that described by Mr. Underwood, but unfortunately he had only seen it at a much more advanced stage. A healthy young man came to him complaining of tenderness about a lower left central. The tooth was evidently dead, and there was a fistula over the root, but it was not carious;

the rest of his teeth were good, and he had not met with any accident. It was extracted, and on examination a minute canal was found leading from the surface of the tooth to the pulp cavity. No doubt this had been closed externally by a thin layer of enamel, which had been worn away or been broken through, and exposure and death of the pulp had been the result.

DR. FIELD suggested that, as apparently only a small filament from the pulp was involved, the best treatment would be to destroy this by the application of some strong escharotic, cut away a small portion of the dentine, and cap with cohesive gold.

MR. STOCKEN said that under the circumstances described by Mr. Underwood he should be disposed to drill a small cavity in the dentine, and then fill it with osteo. He had met with a case having some points of resemblance to that quoted by Mr. Hunt. A patient consulted him with reference to stopping a lower molar. There appeared to be nothing abnormal in the condition of the tooth, which seemed well suited for a gold filling. He filled it accordingly, without the slightest discomfort to the patient. About a year afterwards the patient returned, and reported that she had occasional twinges of pain when she took hot or cold things into her mouth. Mr. Stocken carefully examined the tooth, but could not find any cause for the pain; however, as the sensitiveness continued, he substituted an osteo filling for the gold. As this was not followed by any improvement, he removed the osteo, dressed the cavity with escharotics and plugged it with gutta-percha. This gave only transient relief, so he cautiously opened the pulp cavity, and to his astonishment found the pulp dead, almost dry and free from any unpleasant odour. He treated the cavity with antiseptics, and re-stopped with osteo; since then the patient had not had the slightest inconvenience.

MR. BROWNE-MASON said he should not have hesitated to use the actual cautery in such a case as Mr. Underwood's;

this would have destroyed the fibril, and he should not have anticipated any harm being done to the pulp.

The PRESIDENT said he had a patient, a very powerful man, who had an inveterate habit of grinding his teeth, which were a good deal worn in consequence, and presented occasional sensitive points. The most troublesome teeth in this respect were two lower molars. He (Mr. Turner) was in the habit of removing this sensibility by applying fuming nitric acid by means of a pointed piece of wood. He then polished the teeth with a fine corundum point, and the patient would be free from pain for a year, when the same operation had to be repeated.

MR. MOON remarked that it was of course a well-known fact that the horns of the pulp approached the surface more closely under the cusps of the molars than elsewhere. With regard to the treatment of the case, he could only add one suggestion to those already made, and that was, that if there was any probability of artificial teeth being required, Mr. Underwood should take advantage of the opportunity to raise the bite a little.

MR. UNDERWOOD, in reply, said he was very much obliged for the suggestions which had been offered. He felt very unwilling to cut into a sound tooth, and thought that the insertion of a metal stopping in such a case would not improbably be followed by irritation of the pulp. He hoped that the adoption of the plan suggested by the President might render recourse to any such measures unnecessary.

MR. ACKERY showed models of two cases of transposition of a permanent canine; in one case it occupied the position of the central incisor of the same side, in the other that of the first bicuspid. The temporary canine persisted in both cases.

MR. WILLOUGHBY WEISS showed a left upper lateral, with a very well-developed supplementary cusp.

He also related the history of a remarkable case of salivary calculus surrounding three lower incisors, and showed a model of the patient's mouth.



The patient, a woman, first came to him in April, 1881; her mouth was in a very dirty and neglected state; there was a good deal of tartar about the teeth, but especially about the root of the lower left central, which was entirely surrounded by the deposit. The tooth was loose, and could be removed and replaced by the finger. She refused to have anything done, and was not seen again till June, 1882, when the right central was found to be affected in the same way. She again refused to submit to any treatment, and disappeared until July, 1883, when the left lateral was found to be similarly affected. During this time she had suffered no pain, and was able to masticate fairly, although all three teeth could be removed and replanted at will. About January, 1884, the gums began to get tender, and about the beginning of May she had to take out the loose teeth while eating, replacing them afterwards. At last, in July, 1884, she allowed Mr. Weiss to remove the three teeth, together with the right lateral, which was getting loose, and an artificial denture was fitted. The peculiarity of the case was not the amount of the tartar, but the way in which it was deposited round each tooth, so that each one, as it were, locked its neighbour in its place.

MR. REDMAN, of Brighton, exhibited a face-piece which he had used in the administration of anæsthetics for three years past, and found to fit better than any other which he had tried. It would be found specially useful for patients with thin, hollow cheeks, and for men with thick beards, &c.

The PRESIDENT remarked that he had seen a very good face piece extemporised out of a child's india-rubber ball.

MR. W. A. HUNT (Yeovil) showed a lower molar which had been obliquely fractured during the operation of extracting an upper molar with the key. The fracture had, however, been closed by the deposit of secondary dentine within the pulp cavity, and when the tooth was extracted, thirty-three years after the accident, the pulp was found to be healthy.

MR. DENNANT said he had a suggestion to make. Those

who had been present at the reading of Mr. Campbell's paper at the meeting of the British Dental Association at Edinburgh would remember the very clear and satisfactory manner in which models of the cases he described were exhibited by means of the oxy-hydrogen light. He wished to suggest that it would be a good plan if the Society were to have some similar demonstrations occasionally. Instead of, as at present, getting the model five or ten minutes after the case had been described, members would then be able to follow the description with the model displayed before them. All that was necessary was to have the models photographed beforehand, and this could be done at very trifling expense.

The PRESIDENT said he was informed that Dr. Walker had provided himself with a lantern for use at his lectures on Dental Mechanics, and that he had very kindly placed it at the disposal of the Society for use at the meetings if desired. This lantern was an improvement on that used by Mr. Campbell, in that the representation on the screen could be made from the model itself, without any necessity for its being photographed. He saw no objection to the plan being tried if the members wished it.

He then called upon Mr. F. N. Pedley to read his paper on "Some Points connected with the Treatment of Fracture of the Inferior Maxilla."

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*Some Points connected with Fracture of the  
Inferior Maxilla.*

By F. NEWLAND PEDLEY, M.R.C.S. & L.D.S.ENG.

MR. PRESIDENT AND GENTLEMEN,

THE subject which I have undertaken to bring before you to-night is one that is peculiarly interesting to us, for it gives the widest scope to that combination of manipulative skill and surgical knowledge which forms the ideal of modern dentistry.

The title of this paper sufficiently disclaims any intention on my part of attempting an elaborate thesis on the wide subject of fractures of the maxillæ. The production of the last edition of Mr. Heath's well-known book on "Diseases of the Jaw" added much to a literature which was in some respects deficient: for, at the time that I undertook to write this paper, I knew of no familiar work that contained a clear description of Hammond's splint, save the last edition of "Holmes' System," and even there I had been permitted, by the kindness of Mr. W. H. A. Jacobson, to supply some of the details.

There remains, perhaps, little I can bring before you to-night that is original or novel,



but I shall be more than contented if the record of my past experience in this subject, acquired in hospital, shall be of practical utility to some, and confirmatory of the views of others.

General hospitals offer the best field for the study of this lesion, and I am led, by comparing notes with my professional friends, to infer that Guy's Hospital is especially favoured in the numerous patients with fractured maxillæ who seek aid there.

I have, for some years, studied these cases in assisting Mr. Moon, and could willingly believe that their numerical significance is solely attributable to an intelligent appreciation on the patients' part of the successful form of treatment adopted there; but the suggestive fact cannot be ignored that the hospital drains much of the low district of transpontine London, where heavy boots and clenched fists are the emblems of law and marital authority.

Kicks and blows amongst young adults cause most of the cases that we see; for after middle life the loss of teeth, laxity of capsular ligament, and flattening of the articular surfaces, favour dislocation rather than fracture.

The commonest site is close to the canine tooth, because the bone narrows somewhat at that point, and the great depth of the socket of the tooth tends further to weaken the bone.

The site next in order of frequency to be affected is the angle of the jaw, and then fractures through the neck of the condyle. Separation of the lateral segments of the lower jaw at the symphysis is not common, although I have seen several instances of it, and, as one might expect, it is more prone to occur in early life than later. Multiple fracture is frequently met, and in any given case too careful search cannot be made for a possible second or third point of division. The diagnosis of condyloid fracture, under such circumstances, is not easy, for crepitus is transmitted along the bone from the more anterior spot, and combines with the mobility of the joint in rendering tactile evidence nugatory.

The treatment of a break in any part of the ascending ramus is most unsatisfactory, for the teeth are almost useless as fixed points in the application of a splint, and the upper fragment is short, movable, and attaches powerful muscles. These are the cases in which little can be done but to apply the old gutta-percha external splint, or "boot" as it has been termed, and the same objection to its use is valid against all those other splints that have been devised to retain the fragments in correct position by means of a framework round the teeth, carrying a pad or wings that maintain counter-pressure upon the outer

surface of the cheek over the site of fracture. Lonsdale's, Hill's, and Moon's splints represent this class; of which the latter is said to be the best, yet the inventor has abandoned its use of late years in deference to its defects.

The consequent pain and swelling of the face necessitate the relaxation of the pressure, and in the graver cases, where a sinus with an external opening becomes established, the gutta-percha splint becomes a mere receptacle for putrefying discharges, and is worse than useless.

Little is necessary but to enumerate the previous forms of apparatus; for a familiarity with the use of Hammond's splint renders the admission imperative that it possesses great superiority over all others in those cases where there are firmly implanted teeth in each fragment.

The favourable results that dental surgeons obtain from the use of this splint in hospital practice derives additional force from the consideration that it is chiefly in the complicated cases that the skill of the dental specialist is invoked. This fact was strongly impressed upon my mind in conversation with Mr. Bryant when I was disparaging his splint for fractured inferior maxillæ. There were several of these hospital patients under his treatment at the time, and he maintained that 75 per cent. of the aggregate number of fractures



got well under any treatment, and a great proportion of them escaped attention as dental surgeon's cases. The splint Mr. Bryant was using was made of several thicknesses of plaster of Paris bandage, accurately moulded to the outer surface of the chin and jaw; with the four-tailed bandage as a support.

I watched the patients in question, and was constrained to admit that they progressed favourably, and that the plaster of Paris bandage was light, efficient, and easy of application; yet I think that the more favourable instances of fracture are essentially those which would also yield the best results in the hands of general practitioners by a modification of Hammond's splint much used at Guy's Hospital, and which I will subsequently describe. The exercise of great manipulative skill, in such instances, is not exigent, and there is no need to take a cast of the mouth or to solder the wire.

The typical Hammond's splint, which he has recently described so well, is only demanded where the fracture is multiple, or the displacement is obstinate, and on all occasions the aid of a dentist will wisely be sought in its preparation.

The teeth contiguous to the line of fracture are temporarily fastened together with silk, whilst impressions of the lower and upper jaws are taken in "Stent's" composition or wax; and plaster casts

obtained. This is no easy matter, even for a dentist, in severe cases; for he is embarrassed by the swelling of the face, and the inability of the patient to open the mouth sufficiently for the introduction of a full-sized impression-tray. The mobility of the fragments, and the great pain occasioned, necessitate the use of very soft impression material, and the avoidance of firm pressure. On one occasion I was glad to use half-trays, and to take the impression of half the jaw at the time. This method is less distressing to the patient, and I see no objection to its adoption, provided the upper teeth offer a satisfactory guide for the subsequent articulation of the segments of the lower jaw.

The plaster model of the lower jaw is sawn through at the point or points of fracture, the displacement is corrected, and the normal occlusion obtained by the use of the cast of the upper jaw as a guide. Plaster of Paris is used to fix the segments in their right position.

A loop of wire is framed upon the corrected model, passing behind the last tooth on each side of the lower jaw, surrounding the dental arch like a collar, and accurately fitting the necks of the teeth at the margin of the gum.

Reasons that I have mentioned may lead to the use of models that are imperfect in the region of the back teeth, and in shaping the splint it is not

very important if the wire passes somewhat wide of the posterior surface of the last tooth. The least error in the opposite direction renders the appliance utterly useless.

The wire strand, thus prepared, is slipped over the teeth of the fractured jaw by reducing the displacement, and is secured to two or more teeth on each side of the mouth by means of a binding wire passed in a "figure of 8" round the individual tooth. Quoting Mr. Hammond's description of the "figure of 8," the wire is to be passed between two teeth, "directing it slightly downwards, so that the end will come out under the inner bar of the frame. Have the forefinger of the left hand inside to feel for the point, and with it turn the wire upwards and outwards, so as to avoid wounding the tongue. Then bring the wire back over the inner bar of the frame and under the outer; cross the ends," and twist them together loosely.

The wires do not cause irritation of the gum if a mouth rinse of spirit (1—6 of water) be used.

This mixture finds much favour amongst hospital patients, if made from rectified spirit, for it seems to bear a vague but definite resemblance to whatever form of alcoholic preparation the patient may be addicted to.

The more obstinate the displacement, the stouter should the main wire be, provided the



teeth be not too short in the crown to retain it in position.

A very useful modification of Hammond's splint is much used at Guy's Hospital by which the necessity of soldering and model-taking is obviated: points of special recommendation to the general practitioner.

By its adoption the treatment of the milder forms of fracture is greatly facilitated, and it is especially applicable where the lesion is situated anteriorly, and the displacement is not very marked.

The main strand is not passed behind the last tooth, but between two teeth on each side of the jaw in the following manner. The point of the wire is sharpened by being divided obliquely with cutting pliers, and is passed into the cavity of the mouth between the bicuspid or the more posterior teeth, and is brought out again by being passed, from the lingual surface, between two teeth on the opposite side of the jaw. The intervening portion now lying on the tongue is manipulated into close contact with the lingual surface of the necks of the teeth. The wire is then carried across the labial surface of the teeth, and its ends twisted loosely together. It is not desirable to twist up the main strand very tightly at first, for so doing would impede the passage of the binding wires, and tend to drag away the strand from the

lingual surface of the teeth. The binding wires are passed in the usual way, and twisted together, loosely at first. Finally, all the wires are twisted tight, a few turns being given to first one and then another; the ends are cut short and tucked under the splint to avoid excoriation of the mucous membrane. Rarely should a binding wire be attached to a tooth immediately contiguous to the line of fracture, for loosening of such a tooth is the usual result.

A few special points, as regards the passage of the main wire, are worthy of mention. The teeth should be scaled, and a steel probe should be used as a pilot, and as a gauge of the precise available amount of space between any two teeth.

Usually the chosen interspace on one side of the mouth is a little wider or more favourably situated than on the other, and it is well to begin the operation on the more difficult side, for the light is better and the tongue is not in the way at first.

A slight upward curvature of the end of the wire makes it easier of passage between the teeth, and lessens the risk of pricking the side of the tongue, or the cheek, which is liable to occur at the moment when the short sharp end of the strand emerges from between the teeth, and requires to be raised. A slight perforation of the gum margin is often necessary, and causes little pain

or subsequent irritation; but the tongue and cheek require protection with a finger of the left hand. The prick or scratch that the surgeon's hand is liable to sustain, is of slight extent, but strongly suggestive of traumatic inoculation. This is one of the reasons that have induced me to devise two pairs of forceps of a suitable curvature, length, and strength, and a spoon-shaped spatula to protect the mucous membrane of the mouth, to reflect light, and to direct the tip of the wire upwards. A blunt hook with a notched point, and somewhat similar instruments with curves in opposite directions, are useful in manipulating the wire into contact with the lingual surface of the teeth.

Mr. Moon has latterly introduced an improved method of fastening the ends of the main strand, in place of twisting them together, and hence less likely to displace the fragments. The principle consists in passing the ends of the main wire through a short piece of closely-fitting metal tube, then giving them a sharp bend in the opposite direction, and cutting short. A soft sheathing for the joint in the wire is afforded by a piece of caoutchouc tubing threaded on to the main strand before the metal tube is fixed.

The result obtained by this modification of Hammond's splint is all that can be desired in cases where there is no obstinate horizontal dis-



placement, or where there is only a slight amount in a vertical direction: the latter tends to correct itself. In recent cases an advantage will be obtained by allowing a day or two to elapse before treatment is commenced, in order to diminish the swelling consequent upon the direct violence that caused the fracture. I have only seen one case in which the fracture was not compound, but the risk of considerable necrosis is very slight, and fatalities are very rare.

A fatal case, however, came to my knowledge, which occurred at Bedford, in June last. The patient's jaw was broken at the angle, and near the canine tooth, in a fight.

A gutta-percha splint was applied externally, and failed; and then a gutta-percha appliance was tried inside the mouth. The patient was suffering from a severe cough, and the fragments became displaced. The splint was removed, hæmorrhage occurred from the floor of the mouth, which eventually led to ligature of the common carotid artery. The hæmorrhage ceased, but the patient died.

Treatment may, as a rule, be long deferred, but the most unsatisfactory cases that dentists are called upon to deal with are those that have been long neglected, or represent the failures of general practitioners. Here we may frequently have to cope with marginal necrosis, and, worse still, with

so much callus that it is absolutely impossible to place the fragments in correct position. Such an instance occurred to me last Christmas-tide, and I reported it, amongst numerous others, before the Students' Society of this hospital.

The fracture was oblique, of long standing, and much callus was present. I made an attempt under the full influence of chloroform to reduce the displacement, but in vain. This naturally suggested to me the resection of the ends of the bone, and I think it would have been the correct procedure, if the personal appearance of the patient were of primary importance; but as this patient was married, and it was her own husband who had broken her jaw, I was reconciled to the slight deformity that persisted.

As regards the use of an anæsthetic, it will seldom be requisite and always dangerous: for the tongue becomes thrust backwards by the fingers of the surgeon, and the abundant flow of saliva collects at the back of the mouth, threatening suffocation to the patient. Once only I was obliged to use chloroform for a refractory child; on the other hand, I have succeeded in applying a modified Hammond's splint in the mouth of a patient five years of age, without producing lachrymation, or other obvious signs of disapproval from the little sufferer.

Touching the period during which the wire

should be worn, I look upon six weeks as the shortest period, and at the expiration of that term I keep the patient under supervision until I am quite certain that firm union has taken place. The splint causes no inconvenience whatever after a time; in fact, one child was not brought back to me for five months, and the mother apologetically explained that she had been much engaged, owing to a recent increase in her family and other domestic cares, so she had deferred her visit to the hospital as the wire was comfortable. Meanwhile, the crowns of the developing permanent lateral and canine teeth of the lower jaw were discharged through a fistulous opening by the side of the chin.

This is the only instance which has come under my observation in which the successional teeth have been discharged through the skin at the site of fracture; although it is a common thing for flakes and spicules of necrosed bone to be exfoliated. I much doubt that all these small fragments of necrosed bone are primarily due to comminution of fracture. Weeks and months sometimes elapse before they come away, and it is not improbable that some of these slight sequestra are due to necrosis of the margin of the fractured bone, consequent upon the inflammation occurring at the seat of lesion as a result of the mobility of the fragments and their laceration of the surround-



ing soft tissues. Whatever its correct pathology may be, this exfoliation of necrosed bone greatly retards repair.

There is still another field of surgical practice, closely allied to fractures of the jaw, and eminently suitable for treatment by the wire-splint. I allude to those instances where the lower jaw has to be divided in order to obtain access to malignant growths of the tongue, or floor of the mouth. I reported a case of this description before the Society some months ago, but from press of time it received scant consideration, and I promised to bring the subject forward again, when I should be in a position to give the result of the treatment.

The patient was suffering from epithelioma of the floor of the mouth, and division of the lower jaw was a necessary step in the removal of the growth. Mr. Moon was consulted, and some days before the operation the teeth were thoroughly scaled, and a full Hammond's splint was made and fitted. At the subsequent operation Mr. Clement Lucas divided the jaw through the socket of an incisor tooth, removed at the time. The tumour was excised, and then the fragments of the bone were brought together and fixed in their correct position by means of the Hammond's splint, which was secured to the teeth with binding wires in the usual way. The patient recovered perfectly, with a correct articulation of the teeth.

The splint shown is the one worn by the patient. The credit of the conception is not mine.

The above method is obviously better than the plan of uniting the fragments by means of wire sutures passed through the substance of the bone.

The latter practice has received fair trial, but with very questionable results. The tension of such sutures holds the parts very firmly together at first, but is very liable to cause subsequent loosening from absorption of the surrounding bone. The space between the roots of the lower incisors is so slight that there is great risk of the teeth being injured or periodontitis set up.

In reviewing the steps of the operation, as performed by Mr. Clement Lucas, one possible improvement suggests itself, viz., that the section through the lower jaw should not be merely vertical, but should be made by two oblique cuts meeting at an angle, as described in some books.

In this way the ends of the fragments lock into one another, and retain their position, although the whole of the periosteum is divided, and the cut surfaces of the bone are smooth.

The material used for Hammond's splint, in hospital practice, is iron wire, for its cheapness is a consideration, but in private practice I should certainly prefer gold.

The deterioration in value of sufficient wire for

a splint would be very slight, and it has the recommendation of strength, colour, pliability, and cleanliness. By selection, and by habit of use, gold is the metal to which a dentist would naturally and rationally turn in devising a mechanical appliance to be worn in the mouth. A few simple experiments upon my own teeth have confirmed me in this belief, and enabled me to speak from a patient's point of view.

The claims of Gunning's splint cannot be ignored for those cases in which firmly implanted teeth do not exist in each fragment of the fractured bone, in edentulous cases, and in fractures behind the wisdom tooth.

Gunning's splint may be used in those exceptional instances in which Hammond's is contra-indicated; but it must be remembered that in all the very severe cases that demand the use of Gunning's splint, the upper jaw becomes the splint for the lower. The mouth is therefore closed, the act of mastication is suspended, speech is interfered with, saliva dribbles from the mouth, and there is a sense of great fatigue from the propping open of the jaws. Even the simpler forms of Gunning's splint, which do not require closure of the jaws, are more cumbrous and a greater impediment than Hammond's, and possess no advantage where both are applicable. The above considerations are of great moment to



patients who rely on their daily labour for their subsistence ; for enforced idleness frequently entails a condition of body and mind unfavourable to the process of repair.

I am unwilling to close this paper without making reference to one read at the last meeting of the British Dental Association in Edinburgh, by Mr. W. Campbell, upon "A Method of Treating Fractures of the Inferior Maxilla," and to which he proposed to attach his own name as "Mr. Campbell's method." The splint that he uses consists of a metal cap to fit the teeth of the lower jaw, lined with warmed gutta-percha, and pressed into position. This form of splint is identical, in principle, with one described in Mr. Tomes' text-book of Dental Surgery (2nd edition, 1879, p. 660), which runs thus:—

"An impression of the jaw in wax or plaster is taken : . . . this is cast in plaster, and the displacement remedied by sawing through the plaster model. A gold or vulcanite plate is then made to fit the crowns of the teeth, when the halves of the jaw are reduced to their proper position. In some cases it will be best to make the splint fit loosely, and to line it with warm gutta-percha at the time of introduction ; but whether this course is preferable to making the plate itself fit accurately, can be determined only by the inspection of the individual case."

A very similar description is contained in Heath's "Injuries and Diseases of the Jaws" (2nd edition, p. 39, 1872, and also in the last edition). Here the splint is spoken of as "Mütter's clamp," "modified by Mr. Tomes and others" thus: "The modification consists in making the silver cap fit accurately to the teeth, from some distance on each side of the fracture, by moulding it to a plaster cast of the jaw. The cap is then lined with gutta-percha, which, being warmed when the apparatus is applied, fills up the interstices and fixes the cap, the fragments being maintained in position whilst the application is being made."

Apart from all question of the title by which the apparatus should be known, I should always prefer Hammond's splint when it could be used; for the teeth remain free, and sight of the line of fracture is not obscured.

In conclusion, I regret that Mr. Campbell endorses and quotes an erroneous assertion of Dr. Kingsley's, in the work on "Oral Deformities," when he says, amongst other untenable objections to Hammond's splint, "Furthermore, even when the necessary teeth are *in situ*, and are sufficiently firm, it would frequently be found quite impossible to get any wire between them."

I have never failed in my attempt to pass a binding wire either between the teeth or through

the gum, nor have I yet seen a dried preparation of an inferior maxilla between the teeth of which a wire could not be passed—provided, of course, that the teeth in the mouth be numerous.

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## DISCUSSION.

MR. HENRI WEISS said he was sorry Mr. Hammond had not been present to hear the paper which had just been read. The testimony Mr. Pedley had given as to the value of Mr. Hammond's splint was highly complimentary to its inventor, but there were one or two points in the paper which, speaking on Mr. Hammond's behalf, he (Mr. Weiss) did not like to pass over without notice.

Mr. Pedley had spoken of the difficulty, in some cases, of getting a model of the mouth. This must be admitted to a certain extent; but it must not be forgotten that it was not necessary to obtain an accurate impression of the whole of the teeth and gums, such as was required for other purposes. An impression of the *crowns* of the teeth was all that was required. Nor was it necessary to use a tray; a piece of zinc could be readily cut and bent into shape, and would answer the purpose perfectly. On this he built up some soft wax, and had seldom any difficulty in getting a sufficiently good impression.

Then Mr. Pedley seemed to think that it was quite sufficient to fasten the splint to two or three teeth on either side of the fracture. Mr. Hammond attached great importance to distributing the pressure as much as possible, and therefore always made use of all the teeth that could be made to serve—even the wisdom teeth. For it must be remembered that however firmly implanted teeth might appear, they were easily loosened or moved by a comparatively small amount of force constantly applied, as was very likely to be the case in a broken jaw, with the usual tendency to displacement of the fragments.

Lastly, he gathered from the paper that Mr. Pedley did not attach much importance to the mode of tying, though this, again, was a point on which Mr. Hammond laid great stress;

he held that unless care was taken in this part of the operation there might be a liability for the fracture to gape at the lower edge. With regard to Mr. Pedley's partiality for the use of gold wire, he (Mr. Weiss) could only say that he found iron wire answer the purpose very well: it turned black, but was sufficiently durable, and did not cause any local irritation.

MR. HENRY MOON said it might be supposed that he would naturally be inclined to agree with the views expressed by Mr. Pedley in his paper. But he would at once admit that Mr. Hammond's method of treatment was the best, and in some cases the only one which could be used with success. He felt sure that Mr. Pedley had not the smallest intention of disparaging Mr. Hammond's invention, or his method of using it. All that was claimed for the modification of it which they had adopted at Guy's Hospital was that in cases where there was not much displacement, it gave good results, and that there was certainly a saving of trouble in not having to take a model, or to solder the ends of the wire. They fully appreciated also the advantages of Mr. Hammond's method of twisting up the binding wire; indeed Mr. Pedley had described this at some length in the course of his paper, the general purport of which Mr. Weiss appeared to have to some extent misapprehended.

Fractures of the upper jaw were more rarely met with than those of the lower. He (Mr. Moon) had, however, met with a case in which the superior maxillary bones were separated from each other, the intermaxillary bones being also separated. There was also a transverse fracture under the orbits, and the lower jaw was broken as well. He (Mr. Moon), having secured the lower jaw by means of Hammond's splint, proceeded to fix the upper by the same means. But he found that, owing to the fractures in the malar region, there was a tendency for the jaw-bone to drop downwards and backwards, and at the end of a week he was obliged to remove Hammond's splint, and apply Gunning's. The case then progressed very satisfactorily, and recovery took place without any noticeable alteration of features.

MR. WEST said he occasionally had to deal with very severe cases of fracture of the jaw at the German Hospital. He had been called upon to treat one only a few weeks since. The jaw was broken between the left central and lateral incisors, and the patient had been in hospital a fortnight before he saw him. There was a considerable amount of displacement, and the patient was subject to fits. Hammond's splint being inapplicable, he (Mr. West) took a model, cut it across at the seat of fracture and refixed the fragments in their proper relative positions. He then made a metal cap, lined it with gutta-percha, and put this on whilst the material was soft. An aperture was cut opposite the seat of fracture, so that the position of the fragments could be seen. The result of the treatment was very satisfactory.

MR. J. H. REDMAN, of Brighton, related particulars of a case of fracture of the upper jaw, which he had been called upon to treat at the Sussex County Hospital. The patient had been struck with great violence by a block of wood thrown off by a circular saw. This made a large gash in the cheek and lip just to the right of the nose; the whole upper jaw was freely movable, and dropped considerably, being apparently held only by the soft parts; the vomer was detached from its connections with the superior maxillary and palate bones. An impression of the mouth was taken, and a vulcanite plate made to fit the upper jaw, with wings passing to the outside of the cheek on each side, and held in position by means of a four-tailed bandage. This held the jaw firmly in position, and the patient made an excellent recovery.

MR. W. HARDING (Shrewsbury) said that for some years he used Gunning's splint, but lately he had adopted Hammond's, and was very much pleased with it. He could not, however, induce the surgeons attached to his Infirmary to use it, on account of the difficulty of soldering the ends of the wire.

MR. WALTER COFFIN said he should be glad to know what was the best sort of binding wire to use. Mr. Pedley had recommended gold wire, but this would be found too expen-



sive for some of the cases they were called upon to treat. He (Mr. Coffin) would suggest that probably aluminium wire would be found to answer the purpose well.

With reference to the difficulty which was sometimes met with in taking models of the mouth, he had seen it stated that a sufficiently good impression could be obtained by mixing a good quantity of pyro-phosphate of zinc, making it into the form of a roll, introducing this into the mouth with oiled fingers, holding it until set, and then removing it.

MR. S. J. HUTCHINSON said he hoped Mr. Pedley would present the specimens with which he had illustrated his paper, or at all events duplicates of them, to the museum. He thought Mr. Moon's method of fastening the ends of the wire was a valuable improvement. He should be glad if Mr. Pedley would inform him whether he found Mr. Hammond's splint as useful in cases of multiple fractures of the jaw as in the simpler cases; and also what form of apparatus he found most satisfactory in cases where the teeth had been lost;—did he use Gunning's splint under these circumstances?

MR. STORER BENNETT said he was glad of the opportunity of expressing his opinion of the value of Hammond's splint, even in the worst cases. Thus he had lately been treating at the Middlesex Hospital, in conjunction with Mr. Lawson, a case of fracture of the lower jaw, which had previously been treated elsewhere for three months, but the fracture was still ununited. There was a sequestrum between the fragments; this was removed, the ends of the bone resected, and Hammond's splint applied. Firm union then took place in about six weeks. He wished also to confirm what Mr. Pedley had said as to the importance of scaling as a preliminary operation; it greatly facilitated the passing of the binding wire.

MR. PEDLEY, having been called upon by the President to reply, said he quite agreed with Mr. Henri Weiss that a full-sized Hammond's splint was a more perfect form of apparatus than the modification of it which he had described in his paper. Still, the latter sufficed to give satisfactory results in

a considerable number of cases, and it could be put on by any general practitioner, whilst an average general practitioner could not put on the full-sized Hammond's splint. So far from not having attached sufficient importance to Mr. Hammond's figure of 8 method of putting on the binding wire, he had actually quoted that gentleman's directions for applying it verbatim in his paper.

In reply to Mr. Coffin, he would say that the best wire for the purpose was what was commonly known as "binding wire," and it should be as thick as could be easily passed between the teeth.

He could assure Mr. Hutchinson that Hammond's splint was just as applicable to cases in which there were two, three, or four fractures as to those in which there was only one. It could be applied to any case in which there were firmly implanted teeth in each fragment; the wire must not, however, be attached to loose teeth or to those immediately contiguous to the lines of fracture. He was very much obliged to all those who had joined in the discussion.

The PRESIDENT then announced that at the next meeting, to be held on Monday, December 1st, Mr. J. Bland Sutton, F.R.C.S., would read a paper on "Comparative Dental Pathology."

The Society then adjourned.

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NOTE.—With reference to the remarks on Mr. Campbell's Interdental Splint which appear in the paper by Mr. F. N. Pedley, which we publish in this number of the Transactions, Mr. Campbell asks to be allowed to state that, although when he read his paper at the Annual General Meeting of the British Dental Association at Edinburgh in August, 1883, he believed that the method therein described was original, he does not attach much importance to this point.

It is, however, a fact that he made the interdental splint shown in fig. 1 of his paper, published in this month's issue of the Journal of the British Dental Association, in the year

1875, and that he described this method of treatment before the Odonto-Chirurgical Society in 1877, and before the Odontological Society in March, 1879, previous to the publication of the second edition of Mr. Tomes' work on Dental Surgery, and long before the issue of the edition of Mr. Heath's work on "Diseases and Injuries of the Jaws" from which Mr. Pedley quotes.—ED.

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# Odontological Society of Great Britain.

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## ORDINARY MONTHLY MEETING.

*Monday, December 1st, 1884.*

J. S. TURNER, M.R.C.S., L.D.S. ENG.,  
PRESIDENT, IN THE CHAIR.

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THE Minutes of the previous meeting having been read and confirmed,

MR. EDWARD BARTLETT signed the Obligation Book, and was formally admitted to membership by the President.

THE PRESIDENT announced that MR. GORDON HOOPER, of 112, Harley Street, Cavendish Square, had been duly nominated, and would be balloted for at a subsequent meeting.

THE Curator (MR. HUTCHINSON) announced that, with the sanction of the Council, he had purchased for the Society's Museum the skull and almost the entire skeleton of a gorilla. As this animal was so difficult to obtain, the specimen was very valuable. The Museum had previously contained only a cast of the gorilla's skull.

He also presented, as a donation from himself, portions of the jaws of two Australian Marsupials, viz., the wombat (*Phascolomys fusca*) and the dog-faced opossum (*Thylacinus cynocephalus*).

MR. STORER BENNETT said the skull to which Mr. Hutchinson had just called attention was a very fine one, and was the more valuable because it presented some interesting pathological features. The animal had evidently met with some injury to the mouth and neck, since the hyoid bone had been fractured and reunited by a mass of callus. The jaws also showed evidence of the effects of violence, for one

of the incisor teeth had been knocked out and another broken off; the alveolus of the first had been absorbed. In looking at the skull no one could fail to notice the immense size of the jaws and teeth, with the large diastoma in front of the canines, the receding face, closely set orbits, and prominent eyebrows. The brain cavity was small, and the foramen magnum was set far back, but the zygomata, and all the ridges and prominences for the insertion of muscles, were very largely developed.

The PRESIDENT said it was certainly a most interesting addition to the Society's Museum. They had been fortunate enough to secure almost a complete skeleton, and when it was set up Mr. Charlesworth proposed to place some human bones by the side of it to show the difference.

The PRESIDENT then called upon the members to select two gentlemen to audit the Treasurer's accounts for the year now drawing to a close. Messrs. Walter Coffin and J. F. Corbett were accordingly chosen, and agreed to undertake this duty.

MR. G. C. McADAM, of Hereford, then described a simple but effectual contrivance for the regulation of teeth, which had proved of great service to him in his own practice, and which, although not actually new, for he had found it mentioned by Dr. Farrar as having been suggested to him by Dr. Shepherd, might possibly be new to many members. The apparatus consisted of a thin circular gold band securely fixed to the crown of the tooth by means of phosphate of zinc cement. The method of applying the band was as follows:—first clean the tooth thoroughly with soap and fine pumice powder, then adjust the rubber dam and wipe the tooth over with chloroform, to secure freedom from grease, and to obtain perfect dryness. The band having been previously made and fitted, phosphate of zinc cement mixed to a creamy consistence, was applied to the inside, which should be slightly roughened; the band was then pressed well home on the tooth, held in position until the cement had set, and the superfluous cement then trimmed away. The many uses to which this plan could be adapted would readily suggest themselves. Thus



by means of lugs, hooks, or studs, soldered to the band in any position acquired, traction could be exerted on any point, and an incisor could thus be readily moved or rotated.

It obviated the risk of elastic bands or silk ligatures slipping up under the gum.

The band could be fixed on canine crowns when only half erupted.

By means of a short tube soldered to the band, a socket is formed for the retention of the point of a screw jack.

It was also very useful in fixing a replanted tooth; bands being placed on the loose tooth and on those on either side of it, by means of studs attached to them, the replanted tooth could be lashed firmly in place.

Lastly, its immobility and cleanliness were great recommendations.

MR. WALTER COFFIN said he had long been aware that gold bands attached to the necks of teeth by pyrophosphate of zinc had been occasionally used in regulation cases. It was a somewhat troublesome process, drying the tooth and fitting and fixing the band, but in cases where the tooth was round, or nearly so, the plan might be useful.

MR. W. E. HARDING (Shrewsbury) said he had occasionally made use of this plan for rotating teeth, and had found it answer very satisfactorily. He had not, however, found it necessary to apply the rubber dam and adopt all the other precautions mentioned by Mr. McAdam. He simply wiped and dried the tooth as well as he could before applying the band, and he found no difficulty in getting it securely fixed.

MR. WALTER COFFIN showed a photograph of a Russian boy, fourteen years of age, who was probably the most hairy member of the human race. As seen in the photograph his face reminded one strongly of a Scotch terrier, being almost entirely covered, as well as his body, with long shaggy hair. He was the last survivor of the "Kostroma Family," so called from the Russian province of which they were natives, several members of which exhibited the same peculiarity. Mr. Coffin had examined him several times

during the last ten years. When first seen, at five years of age, he had no teeth, and at the present time he was not much better off, having only two canines in the upper jaw and three incisors in the lower, all temporary teeth. His father and a brother were similarly affected with "*hypertrichosis universalis*"; the former died in 1881, aged fifty-nine; the latter died young about eight years ago.

MR. D. HEPBURN said he had examined the boy and took a model of his mouth when he was about seven years old; he had then six teeth in the lower jaw, but none in the upper. He examined at the same time the mouth of the boy's father, who was equally hairy and practically edentulous, and was much struck with the horny condition of the mucous membrane of the upper jaw. The gums were so hard that he seemed to have no difficulty in masticating the vegetable diet on which he lived.

MR. GADDES remarked that the fact that the boy had certain temporary teeth, but that there were no signs of any of the permanent set, seemed to him to be an interesting feature in the case. It was said that the temporary teeth were to be considered as being additional to the permanent series; here, however, the temporary teeth were present, but there was an absence of any sign of their successors. This particular case, therefore, might perhaps afford some ground for argument against the statement to which he had referred.

MR. COFFIN said that in the case of the boy the gums were not at all indurated.

DR. ST. GEORGE ELLIOTT exhibited and presented to the Museum three very curious and interesting specimens of Japanese artificial teeth. The Japanese were the only nation outside the limits of Western civilization who understood the fitting of artificial teeth. They had derived most of their scientific and technical knowledge from the Chinese, but in this matter they were in advance of their teachers, for the Chinese had no idea of fitting an artificial denture. They could indeed carve a row of incisors and fasten them to the teeth on either side; but these productions were only

intended for ornament, not for use, whilst those of Japanese manufacture were thoroughly efficient. Thus a Japanese physician who came to him for a set of teeth, remarked that though the foreign teeth were more natural in appearance, those of home manufacture were quite as good from a practical point of view, and in proof of this he took up a piece of hard "rock candy," and crunched it between his false teeth. These dentures were made on wooden bases; the front teeth were made from quartz pebbles ground down, but the process of mastication was performed by copper nails, which occupied the place of the molars. It was an interesting fact, also, that the fixing of dentures by means of suction had been known to the Japanese for at least two hundred years. The base plates were carved by hand, the process being as follows. An impression of the mouth was taken in wax, and from this a model was made, also in wax. The model was then coated all over with red pigment, and the plate, after being roughly shaped, was placed on the model thus coloured. The red patches on the under surface of the plate were then carefully cut away, until at last it fitted the model exactly. It was then tried in the mouth in the same way, the gums being covered with the pigment, and any inaccuracy readily detected. Dr. Elliott added that he had himself made use of this plan occasionally, and had found it of service in detecting an obscure misfit. One of the dentures he handed round had been in use for fifteen years.

The PRESIDENT said he could remember the time when this style of dentistry was not uncommon. Gold plates were used in some cases, but the majority were made of bone, and were carved and fitted by hand labour. Wood, however, was only used for the juniors to learn on. He had a vivid recollection of this troublesome process, the most important point being always to place the block on the model in exactly the same position.

MR. WEISS said wood was certainly used as a base in some cases in former days, and he believed it was not very unusual amongst poor patients. He remembered a ship's carpenter, a very ingenious man, who had voyaged with Captain



Scoresby, who made his father a set of teeth on wood, and was very proud of his work.

MR. S. J. HUTCHINSON read the following communication from Mr. Oakley Coles, on the use of Cocaine in dental surgery :—

“A week ago I had placed at my disposal by Mr. Martindale a small quantity of the new drug cocaine dissolved in oil of cloves. The experiments I have been able to make confirm the evidence which had already been given as to its remarkable anæsthetic properties. One application of a 20 per cent. solution will allay sensitiveness in the dentine; two applications at an interval of five minutes will suspend for a time the sensibility of an exposed pulp.

“It has been stated that, if properly applied and used in sufficient quantity and of adequate strength, cocaine will enable the operator to remove a tooth without pain. Of this I have at present no experience, but there can be no doubt as to its utility in dental surgery. The only point to be decided is in reference to the form in which it may be most conveniently used. It is soluble in water, glycerine, the essential oils, and chloroform, but not in ether. It is quite possible that it may be most efficacious in the cavity of a tooth if used in powder or in the solid crystalline form.

“It promises, however, to be so useful in many forms, that our efforts must be directed to its application in a variety of cases, as well as in a variety of forms. Time and experience will doubtless indicate the best vehicle for its exhibition, if we once ascertain the limits of its power as a local anæsthetic.”

Mr. Hutchinson added, that it was no doubt known to most of those present, that this drug had been used with great success in ophthalmic practice, and from this it was inferred that it would also prove useful in dental surgery. His own experience of its effects was limited; he found, however, that a 20 per cent. solution removed the sensitiveness of an exposed pulp. Perhaps some of the members present might be able to give more information on the subject. He particularly wished to know if any one had used the hydrochlorate of cocaine as a local anæsthetic for tooth extraction.

MR. WOODRUFF said he had tried a 4 per cent. solution as an application to sensitive dentine, but had found it useless.

MR. STORER BENNETT said he had begun with a 4 per cent. solution. He dressed a cavity the surface of which was formed of hard dentine with this solution, and left it for half-an-hour, but it had apparently produced no effect on the sensibility. Next he applied it in the same way to soft dentine, but with no better result. Then he tried a 10 per cent. mixture with vaseline, and left it sealed up for forty-eight hours, but with little benefit to the patient. Lastly he applied the 10 per cent. ointment, and left it for a week; this certainly had a better effect, and the patient said "the tooth felt numbed." He was going to try a 20 per cent. strength of the muriate, which he believed had been found much more efficacious than the uncombined cocaine. It was also more expensive, cocaine being 10*d.* a grain, and the muriate 2*s.* 6*d.* a grain. He would suggest that a small committee be appointed to investigate the properties of this drug, as regards its effects on the dental organs, and to report upon them.

MR. WALTER COFFIN said he was trying to get an oleate of cocaine made, as this had been found to be a very good way of using alkaloids generally.

MR. W. HERN said he had lately extracted a lower wisdom tooth for an ophthalmic surgeon; the operation was followed by very acute pain in all three divisions of the fifth nerve. In the hope of relieving this he inserted some drops of a 4 per cent. solution of cocaine into the socket, but it had no effect on the pain.

The PRESIDENT remarked that the drug appeared to be quite worthy of careful investigation, but he thought it was scarcely worth while to appoint a committee for this purpose. In all probability a great many of the members would be trying it, and he would rather suggest that the whole Society should form itself into a committee for the purpose of this investigation. He would now call upon Mr. Sutton to read his paper on "Comparative Dental Pathology."

*Comparative Dental Pathology.*

BY J. BLAND SUTTON, F.R.C.S.ENG.,  
*Lecturer on Comparative Anatomy, and Senior Demonstrator of Anatomy,  
Middlesex Hospital Medical College.*

CONTENTS.

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Supplementary Cases.  
Odontomes.  
Alveolar Abscess.  
Constitutional Disease and Premature Shedding of Teeth.  
Cleft Palate.  
Hypertrophied Birds' Beaks.

THIS paper is intended to support certain opinions set forth in a communication made to this Society about a year ago ; also to supplement some of the examples of disease there recorded, and to give other details concerning a few of the cases mentioned therein.

Last February, Professor Owen reminded me in a letter that there is evidence of disease of the teeth among extinct animals, and at the same time kindly gave me the reference to the following case, which is described in his "History of British Fossil Mammalia," p. 388 :—"The tooth was a fossil molar of a large-sized horse, *Equus fossilis*, from the tertiary formations near Cromer. The grinding surface measured one inch and five



lines antero-posteriorly, and eight lines from side to side. The tooth was from the lower jaw, and presented a swelling near the base of the implanted part. To ascertain the cause of this enlargement a transverse section was made, when a spherical cavity was exposed large enough to contain a pistol-ball. The inner surface was smooth; the parietes of this cavity, composed of dentine and enamel of the natural structure, were from one to two lines and a half thick, and were entire and imperforate. The water percolating the stratum in which this tooth had lain had found access to the cavity through the porous texture of its walls, and had deposited on its interior a thin ferruginous crust, but the cavity had evidently been the result of some inflammatory and ulcerative process in the original formative pulp of the tooth" (Fig. 1).

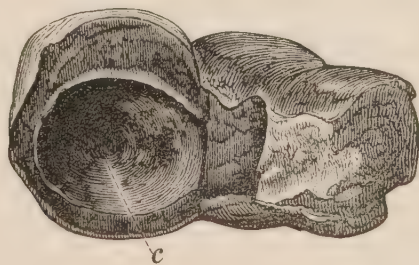


FIG. 1.—Section of the fang of a tooth from *Equus fossilis*; after Owen. An example of primeval disease.

The above instance of primeval disease is in no small degree interesting, and there are many recorded examples of disease in the bony structures

of animals now extinct. It is not improbable that if observations on diseases of teeth be carefully investigated on a widely extended basis, the notion that "dental caries" is a result of high civilisation will require some amendment.

Before entering into the description of new instances of disease of the dental tissues in wild animals, further particulars must be given concerning two or three of the cases which were detailed in the Transactions of this Society last session. (January, 1884.)

Under the heading of "Abnormality of Direction," an example of aberration was given from a babirussa. The curiously curved canine teeth becoming altered in their course, had commenced to make their way into the animal's skull, but the ends were cut to prevent this untoward occurrence.

Some months after this operation the animal died, and an opportunity was thus afforded of examining the sockets of the teeth. It turned out that these elongated canines, like the long tusks of elephants, were movable in their sockets, but to a much greater degree in the babirussa than in the elephant. Hence there is very little doubt that the abnormal direction taken by these teeth in the babirussa, when in captivity, is due to the animal rubbing them against the walls of its prison.

Among examples of excessive growth the incisors of a beaver were instanced, which had grown so long that they were cut in order to prevent the animal dying from starvation. On examining the cut ends of these teeth, which are now in the Museum of this Society, it will be noticed that the prolongation of the pulp chamber had been opened where its lumen was rather large. This made me anxious to ascertain the result, on the structure of the tooth, of this interference.

Two months ago Mr. Bartlett found it necessary again to cut the teeth; for, notwithstanding the logs of wood, stumps, and small trees which were put into the beaver's enclosure, whereon the animals might display their wood-cutting propensities, their length had again become detrimental to the beaver. With his characteristic kindness Mr. Bartlett placed the pieces of the teeth at my disposal.

I was fortunate enough to interest my friend, Mr. J. J. Andrews, of Belfast, in the question. He made with great skill some beautiful sections of one of the incisors, and furnished the following report:—

“The pulp is quite obliterated and calcified throughout the whole length of the redundant portion of the tooth. The material filling up the pulp chamber is very granular and irregular in form, with here and there larger masses inter-



posed. The surrounding dentine is not of good structure, and presents in places large spheroidal masses of secondary formation. In other places large numbers of irregular dark patches, like lacunæ, are visible."

*Odontomes.*

Nearly a year ago I brought before this Society an example of what were supposed to be two supernumerary teeth, which were to be seen on the hard palate of a marmot.

Some months after the case was reported, a young marmot died in the Zoological Gardens, and on inspecting its mouth an abnormal condition of the incisors was detected. On macerating the skull no less than four odontomes were found, one in connection with each of the incisor teeth. It became evident to me that the structures described as supernumerary teeth in the first marmot might turn out to be odontomes also, and such they are; for on cutting away the facial bones the upper incisors were found to extend backwards and become continuous with the abnormal structures on the palate. As these "tooth tumours" are of some interest it will be well to enter into some details concerning them.

Normally the marmot's dental formula stands thus—

$$I. \frac{2}{2} \quad C. \frac{0}{0} \quad M. \text{ and } P. \frac{5}{4} = \frac{7}{6}.$$

The upper incisors, starting in the premaxillary bones, quickly infringe upon the limits of the maxillo-premaxillary sutures, eventually finding a resting place in the maxilla itself. In this they agree with those of many other rodents. In the two specimens before us, however, the palatal process

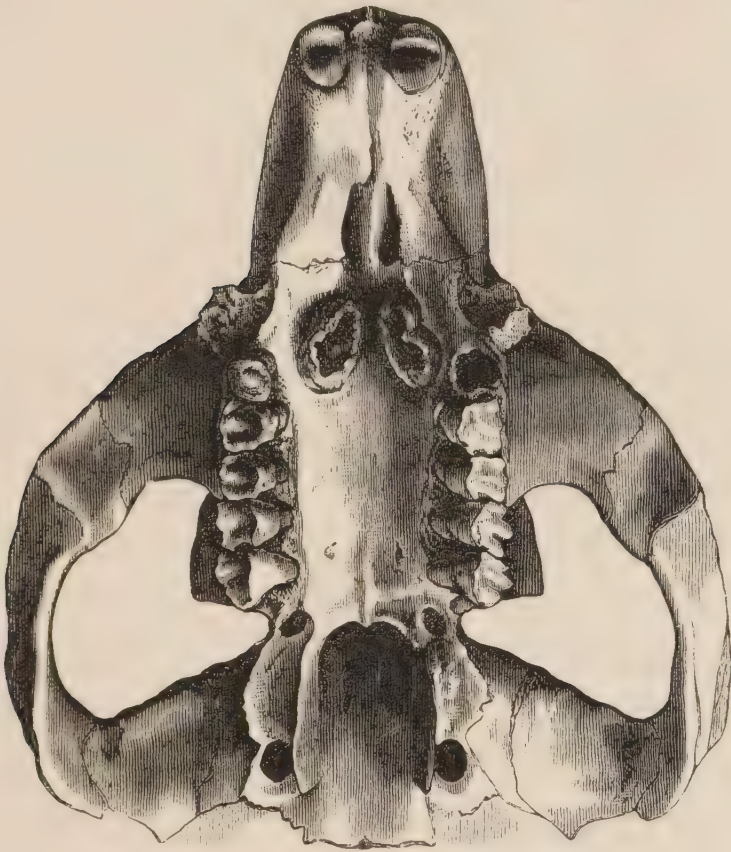


FIG. 2.—Hard palate of Marmot. Odontomes connected with the roots of the upper incisor teeth appearing on the hard palate.

of the superior maxilla has yielded, allowing the fangs of the teeth to appear on the hard palate, as shown in Fig. 2. It would appear that inflamma-

tion was then set up, whereby the pulp became calcified and the chamber filled up with secondary dentine.

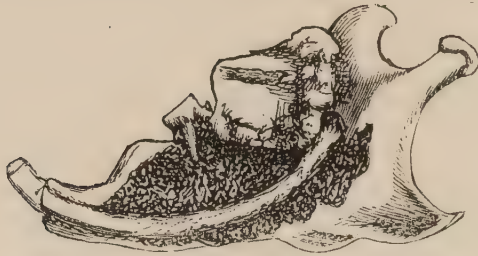


FIG. 3.—Lower jaw of a young Marmot with a large odontome connected with the root of the lower incisor tooth.

With respect to the lower incisors in the second case, Fig. 3 shows the arrangement of the teeth in the lower jaw. The outer plate of the inferior maxilla of the left side of a young marmot has been cut away in order to show the incisor tooth *in situ*. The tooth projects very little above the alveolar margin, and has a very thin cap of enamel; passing backwards it lies below the inferior dental canal until its extremity reaches the coronoid process, where a considerable cavity exists for its reception. All that portion of the tooth which lies hidden in the bone presents a rugged surface. At the base of the coronoid process the tooth ends in a large odontome, which mounts upwards as high as the summit of that process, which has become hollowed out and thinned to contain it, the pressure of the growth



having caused considerable atrophy of the bone ; in some places the maxilla is so thinned as to yield to the pressure of the nail.

My friend Mr. J. J. Andrews has been good enough to make some sections of the growth, and to illustrate its microscopical appearances and minute structure by some admirable drawings. The following is his description :—

“The tumour has a slightly lobulated appearance, as if made of spherules ; the surface in places presents irregular markings. It measures, in length, three-fourths of an inch ; in width, one-third of an inch, and is half an inch in depth. Remembering that the lower jaw is only three inches long by one inch in the widest part, this tumour will be seen to be of some considerable size relatively to the bulk of the animal.

“The normal truncated hollow seen in these teeth is completely filled with secondary dentine, except in a few irregular spaces here and there.

“The main mass of the growth is dentine, some parts of it displaying interglobular spaces ; patches of enamel may be seen in some part of the tumour, and a small quantity of cementum surrounds it, and in places runs into the interior.”

Fig. 4 shows a section of the tumour magnified about ten times. At the base is seen the small pedicle by which the tooth and odontome were attached.



FIG. 4.—Section of the odontome magnified about ten times.

Fig. 5 represents a transverse section through the centre of the tooth. The outer layer of dentine seems to be of fair structure, but the pulp chamber is filled with secondary dentine. All the



sections show that there has been a great deal of disturbance during the development of the tooth.



FIG. 5.—Section of the Marmot's tooth showing the pulp chamber obliterated with secondary dentine.

### *Alveolar Abscess.*

An interesting example of this affection occurred in a kangaroo. In the month of March, 1884, one of these animals died, and a swelling was observed below the symphysis of the lower jaw; this turned out to be an abscess connected with the roots of the large procumbent incisors. As far as one can trace the history of events in the case it would seem to be much as follows :—

By some mischance the extremity of the two teeth were broken, so as to expose the pulp. Inflammation and suppuration of the pulp followed,



leading to the formation of an abscess deeply in the substance of the jaw ; for it must be remembered that the sockets of the lower incisors of the kangaroos extend as far back as the mental foramen.

As the formation of pus proceeded, the morbid material on the left side made a vent for itself and came out at the mental foramen ; later on, the inner side of the maxilla yielded, allowing the pus to pass upwards into the mouth and downwards into the integument lying below the jaw : in this situation it was joined by pus from the abscess cavity in the right half of the maxilla. In this case we have two alveolar abscesses communicating with each other by means of an abscess common to the two, situated in the integument. Fig. 6 shows the two maxillæ on the left side, the bulging M marks the mental foramen with everted edges, the result of the inflammation. The interest of the case does not end here however.

In a previous paper attention was drawn to the fact that trivial (so far as life is concerned) in man as an alveolar abscess may be, nevertheless in animals it is a frequent cause of death on account of the purulent secretion being inspired and setting up septic pneumonia. In this kangaroo the abscess gave rise to a condition akin to pyæmia, for the shoulder and elbow joints of both sides, the right knee, and both ankle joints, were filled with pus, exactly as one sees it in cases of septic poisoning.



FIG. 6.—Lower jaw of a Kangaroo affected with alveolar abscess resulting from an exposed pulp. Pus made its way out through the mental foramen.

Whilst on the subject of alveolar abscess, it may be well to mention that when the skeleton of the celebrated elephant Chuny was being prepared, it was discovered that the socket of one of the tusks contained a quart or two of pus, and on the tusk itself some inflammatory deposit and an indentation. The learned translator of Otto's "Human and Com-

parative Pathological Anatomy" (South) concludes that the ungovernable violence exhibited by this brute at Exeter Change was due to pain the result of the abscess; but Mr. A. D. Bartlett, the able Superintendent of the Zoological Gardens, who is perfectly acquainted with the facts of this remarkable case, says that the animal in his violence, the undoubted result of sexual passion, broke the tusks into pieces and exposed the pulp, thereby giving rise to inflammation and subsequent suppuration.

The case now to be related serves as a striking example of the manner in which trivial anatomical peculiarities modify the baneful effects of disease.

A small rat kangaroo (*Hypsiprymnus*) broke the tip of its left procumbent lower incisor so as to expose the pulp. The extent of damage was much the same as in the case of the unfortunate kangaroo whose history has been detailed. The exposed pulp inflamed and suppurated, giving rise to a small alveolar abscess.

If attention be now directed to Fig. 7, which represents the inner side of the left lower jaw of *Hypsiprymnus*, a small foramen will be observed situated in a line with the posterior border of the huge premolar. This foramen was present in all examples of *Hypsiprymnus* I have had opportunity of examining. It communicates with the socket of the incisor tooth, so that if this tooth



be withdrawn a continuous tunnel leads from this opening through the tooth socket, and so on to the alveolar border of the jaw.

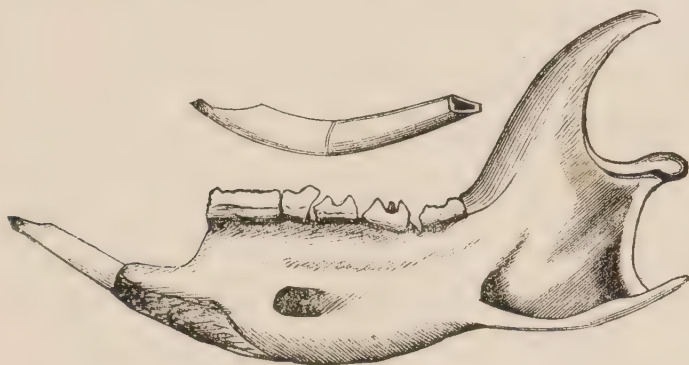


FIG. 7.—Lower jaw of *Hypsiprymnus*. The pus resulting from an alveolar abscess escaped through the opening on the inner side of the jaw. (See text.)

When the pulp suppurated, the pus could not collect in any quantity, for this foramen offered free drainage, and the purulent matter burrowing under the mucous membrane, made its way into the mouth, and thus was prevented from giving rise to such disastrous consequences as in the kangaroo whose case was first considered.

The next specimen is of some interest as belonging to an Esquimaux dog, brought to England from the Arctic regions, by the exploring ship "Pandora," and presented to the Zoological Society by Captain Allen Young. An alveolar abscess seems to have arisen in connection with the second molar tooth in the lower jaw; this tooth has necrosed, and a considerable

portion of the outer surface of the left inferior maxilla has disappeared so as to lay bare the sockets of the premolar teeth, the margins of the bone being sclerosed. The pus has burrowed and involved the sectorial tooth and exposed its fangs, the tooth having suffered necrosis in consequence. The left canine tooth is broken off short. The sectorial and premolar teeth of the right side have disappeared, and the alveolus belonging to them has undergone absorption. The buccal mucous membrane was extensively ulcerated. This is the most severe case of its kind that has yet come under my notice.

The subject of alveolar abscess will be concluded with one more example. A marmoset fractured the left upper canine tooth in its socket; this has led to the formation of pus and absorption of the alveolus, which presents a worm-eaten appearance.

These cases, taken with those published in my previous paper, show conclusively that, in common with man, monkeys, from the chimpanzee to the marmoset, elephants, horses, deer, antelopes, dogs, and kangaroos are subject to alveolar abscess.

### *Constitutional Disease and Premature Shedding of Teeth.*

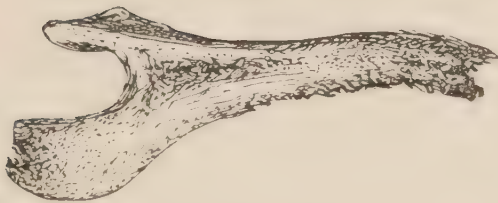
On a previous occasion attention was drawn to the fact that premature shedding of the teeth may

result from constitutional diseases. Further inquiry into this matter tends to support the view.

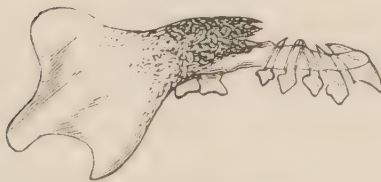
In a crab-eating opossum, obtained for purposes of dissection, the teeth were found to be very loose, and on examining the mouth and detaching the mucous membrane, all the teeth in the upper and lower jaw came away with the membrane, and looked exactly as though they were rows of nails, driven for half their length through a strip of leather.



POTTO.



OPOSSUM.



MARMOSET.

FIG. 8.—Lower jaw of a Lemur (*Perodicticus potti*), an Opossum (*Didelphys cancrivora*), and a Marmoset (*Hapale jacchus*), showing various degrees of alveolar absorption, the result of constitutional disease.



The condition of the jaws was remarkable, the bones were so thin and soft that they could be twisted and bent like a piece of thin gutta-percha. Every long bone in the skeleton was similarly affected, the disease being in its nature like "mollities ossium." The animal was nearly adult, but all the epiphyses had not quite suffered obliteration. (Fig. 8, Opossum.)

About the same time a snake, an anaconda, measuring 17 feet in length, and of girth proportionate, died, and was brought to the Prosector's Room. On examination, it turned out that every bone in the skeleton was more or less affected with a disease which had much the appearance of rheumatoid arthritis. The articulations between the ribheads and the vertebral bodies were most affected. The parts which interest us most here are the teeth. In the ordinary way this snake should possess four rows above, two on either side, and one row below in each inferior maxilla, in all somewhere about two hundred teeth.

In this snake, however, the mucous membrane was so thick that it obscured such teeth as were in the jaws, and one could pass the finger over the buccal mucous membrane without perceiving more than three or four. On macerating the skull numerous small stunted teeth were found, the majority of which came away with the mucous membrane, leaving small carious sockets.

Such examples as this of the premature loss of teeth in constricting snakes are by no means uncommon, and I have been led to look closely into the question with the following result. Mr. Charles Tomes has satisfactorily demonstrated that in *Ophidia*, among others, the teeth do not come into contact directly with the osseous tissue of the jaw by their bases, but that coincident with the development of a tooth a formation of bony matter occurs, whereby the base of the tooth is firmly cemented to the jaw-bone proper. This



FIG. 9.—Section of the tooth of an Anaconda, showing absorption of “the bone of attachment” due to constitutional disease.

bone, which Mr. Tomes very aptly terms "bone of attachment," is of loose and open texture, and is easily absorbed; then the tooth falls.

My explanation is this. If, as is so often the case, a snake in confinement suffers from bone disease, the first bony texture to suffer would naturally be such imperfectly formed material as the "bone of attachment," and such I consider to be the case; this soft bone is affected by disease, softens, and allows the teeth to fall, as in carnivora, when affected with mollities ossium, their alveolus absorbs, and the teeth fall out prematurely. It may also happen that as many of these teeth are defective in size, the constitutional disturbance may have some deleterious effect on the formation of the "bone of attachment;" indeed it is just possible that the early fall of the teeth may be due in part to defective quality and deficient quantity, as well as to premature absorption of the attaching material. Fig. 9 represents the condition in an anaconda.

Another very good example of abnormal absorption of the alveolus is afforded by the jaw of the rare little lemur known as Bosman's Potto (*Perodicticus potto*). This animal had lived in confinement for three months previous to its death, which was brought about by atelectasis, resulting from the thorax yielding to atmospheric pressure, having been softened by rickets.



If the jaw be examined it will be seen that in this very short time, even in a young animal, the alveolar margins of the jaws have undergone extensive softening, so that the fangs of the teeth are distinctly visible. This effect is more obvious if the abnormal maxillæ be compared with healthy ones. (Fig. 8, Potto.)

The next specimen is the skull of a marmoset (*Hapale jacchus*), also rickety, but the alveolus is so soft that the teeth may be moved about in either jaw as freely as though they were set in soft putty. In Fig. 8 is represented all that remained of the lower jaw of a rickety marmoset; the symphysis and anterior part of the body of the bone have disappeared. With this array of facts before us—and, be it remembered, these cases are only selections from numbers which come before me—it must be conceded that in animals premature falling of the teeth is associated with constitutional diseases. Do the same facts apply to the human race?

The following is a remarkable case in point:—

During the present year I presented to the Museum of the Middlesex Hospital a skull of an old woman which presented the following peculiarities. The entire skull had suffered general diminution in size and thickness; its weight is fourteen ounces, as compared with twenty-four ounces the weight of an average European skull.

The alveolar margins of both jaws have suffered atrophy to such an extent, that in the superior maxilla the alveolus is on a level with the hard palate, whilst the lower jaw is nothing but a slender rod of bone weighing one ounce, as compared with three-and-a-half ounces the weight of a lower jaw of a lad of twenty years.

The degree of absorption in the upper jaw may be estimated from the fact that the symphysis menti projects one inch beyond the most anterior limit of the premaxillary bone. This extensive atrophy was not limited to the skull, but was manifest throughout the entire skeleton, for all the bones from the femur to the terminal phalanges were affected by this peculiar "osteoporotic" process.

In my previous paper on these subjects I expressed myself cautiously as to the probability of premature absorption of the alveolus in man being really not a local affection, but associated with some general disturbance of the osseous system. Further inquiry into the question has strengthened that conviction, and it may now be stated that in many instances such is the case.

It must be borne in mind that in drawing conclusions as to the nature of the absorption of alveolus in the preceding cases, every care has been taken to exclude those examples of absorption

of the alveolus which are so often associated with a large accumulation of tartar on the teeth. If the present series of cases be examined it will be clearly seen that the teeth are perfectly clean and free from deposit; this feature seems to be absolutely characteristic of this form of premature absorption of alveolus, viz., that it is unaccompanied with deposition of tartar.

The specimen now exhibited reveals a very different condition. It is the lower jaw of a Macaque monkey, whose teeth are crusted over with a large quantity of tartar, and at the same time there is actual absorption of alveolus around the teeth so affected. The skeleton of this monkey was in all respects healthy, no trace of rickets being observable. If the jaws of the macaque be compared with those of potto, the following facts come out very strikingly.

In potto the bone betrays no evidence of inflammation; in the macaque the bone is rough and porous, and in places gives one the impression that some new bone had been deposited from the periosteum consequent on inflammation. Whether the tartar causes the inflammation or is a result of that process is a point for discussion, but it affords a ready means of distinction between the two classes of absorption, viz.:

One is a constitutional affection, and non-inflammatory. The other, local and inflammatory.



*Cleft Palate.*

It has long been known that animals, other than man, suffer from the deformity known as cleft palate. The Teratological Series in the Museum of the College of Surgeons, London, contains some examples derived from calves, dogs, and lions. In the case of the calves the cleft is situated between the maxillary bones, but does not extend sufficiently far forwards to involve the premaxillæ.

The case of the young lion is of sufficient interest to warrant a few details.

The specimen is thus described in the catalogue: "The head of a young lion, born in the Zoological Gardens, March, 1862, with a cleft palate and arrested growth of the septum narium. The litter consisted of two, this and another in the same condition. The alveoli of both jaws are arrested also. Several other lion cubs born in the Gardens have been similarly affected."

The probable cause of this arrest of development is a very interesting and important one. At the time these lions were born it was customary to feed the larger carnivora on horseflesh alone. Later, it was deemed advisable to vary their food by treating them to a little goat's flesh occasionally, for it was found that the bones of horses were too tough and resisting for even the strong jaws of

a lion or tiger, whereas the bones of goats are smaller, less dense, and are in consequence more easily crushed, and enable the beast to obtain a greater quantity of earthy phosphates into the system. The result has been that since this mode of feeding was adopted cleft palate has not been observed in the young of lions and tigers born in the Gardens.

The history of these cases clearly show that anything tending to prevent the proper assimilation of lime salts by the mother may produce cleft palate in the offspring. May not too great a demand of lime salts produce a similar effect? The following is a case in point :—

A Scotch terrier bitch, six years of age, had had some six or seven litters of young ones when, to the owner's surprise, she was delivered of four little ones all of which had clefts in their palates. It was suggested in explanation, that when pregnant she had been frightened by a parrot kept in the house, and to whom the animal had the greatest aversion, for the parrot used to fly at the bitch with open mouth, and show the deficiency in the hard palate normal to birds in general. Of course no one pays heed to such stories as these. As was to be expected, the pups, unable to suck, died within a few hours of their birth. Since that defective litter the bitch in question has been delivered of several litters of pups, all of

which possessed defective palates. The explanation seems to be this :—The animal had been exhausted by frequent pregnancies, and the demand made on her system, first to produce these young, and afterwards to nurse them, had drained her store of lime salts, in consequence of which sufficient earthy matter could not be produced to complete the skeletons of her progenies properly; cleft palate was the result. How far these causes may operate in producing cleft palate in man is a subject worthy of inquiry. So far as I have had opportunity of seeing cases, the above view has been borne out thoroughly.

The subject of cleft palate in man and animals has been made the subject of some interesting and careful observations by Professor Paul Albrecht, of Brussels. This anatomist endeavours to show by reference to cases of cleft palate, that the premaxillary bone is developed from two centres. In those cases in which the cleft is complete it may pass through the premaxillary bone in such a manner that the median portion supports the central incisor, whilst the outer piece supports the lateral incisor, the corresponding maxillo-premaxillary suture remaining intact (*vide* Fig. 10A). It has usually been maintained that the cleft passes out through the maxillo-premaxillary suture as shown by the arrow in Fig. 10B.

Professor Albrecht proceeds even farther, and



adduces the following interesting facts :—In some cases where the cleft in the palate is double, so as

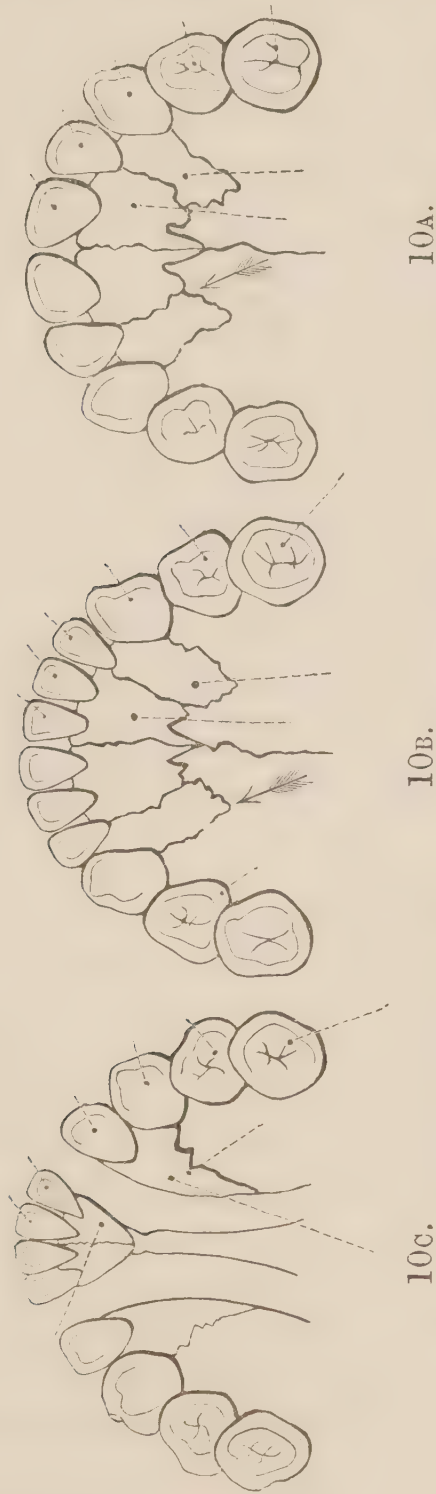


FIG. 10.—Three figures of the hard palate to illustrate Professor Albrecht's views on cleft palate. (*Vide text.*)

to isolate the inner portion of the premaxillary bones and leave them jutting forwards on the end of the vomer, the median piece may develop two incisor teeth in each half, and yet an incisor tooth may be found lodged in a socket and separated by the maxillo-premaxillary suture from the canine, as in Fig. 10c. Arguing from this, Prof. Albrecht endeavours to show that, phylogenetically, man inherits *three incisors* on each side, but that in the course of development the middle one of the three on either side is suppressed. In those cases of cleft palate with an enlarged median portion, Professor Albrecht points out that there is a greater blood supply than usual, and that the extra nourishment enables the usually suppressed second incisor to proceed to full development, and show that the so-called second incisor is actually the third.

The question of the duplicity of the premaxillary bone is to me one of extreme interest, and as for some long time past I have been engaged in investigating the development of the facial bones, no time was lost in looking into the question, with the following result :—After the most careful search I have been unable to assure myself of the duplicity of the centres for each incisive bone. That in certain cases of malformation the cleft does pass between the incisor teeth and miss the maxillo-premaxillary suture is unquestionable, for

Prof. Albrecht fortifies his argument by drawings and references beyond all doubt.

But too great a protest cannot be raised against a practice now getting very prevalent—of drawing conclusions as to morphology from pathological specimens; nothing could be more fallacious. For example, the bodies of the vertebræ are developed from one primary centre in the normal spine: yet in certain abnormal conditions, especially in *spina bifida* and the like, it is not uncommon to find the vertebral centra split in twain in many parts of the column, or in places to find only half a vertebra developed; this may take place in several parts of the spine in one individual. My view is, that, normally, the premaxillary bone is developed from one centre, but that in some cases of cleft palate it may arise from two centres. The question of course arises, If each premaxillary bone does not originate from two discrete centres, how may its bifid condition in cases of cleft palate be explained? The solution of the problem seems to be this:—The premaxillary bone is originally developed in membrane, and at some little distance from the median line, which in the foetus is occupied by the thick cartilage known as the ethmo-vomerine plate. After a time the premaxillary ossifications involve the anterior extremity of this cartilage, so that the inner portion of these bones are really of cartilage



origin. If any interference take place to prevent the premaxillary bone or bones meeting the ethmovermerine plate, the tip of this cartilage ossifies on its own account.

This condition is easily seen in the human foetus, and is most obvious in the skull of a colt at birth. The examination of a very great number of foetuses has persuaded me that normally *each premaxillary bone arises from one centre only.*

With regard to the question of the second or suppressed incisor tooth, it is one of very great interest to those engaged in investigating the teeth: it may indicate an additional interest to cases of supernumerary incisors. All interested in the question should refer to Dr. Albrecht's admirable paper in "Trans. Société d'Anthropologie de Bruxelles," October, 1882.

The Museum of the Middlesex Hospital contains among its series of casts two models of cleft palates showing distinctly that the cleft passes between the two left incisors, and not through the maxillo-premaxillary suture.

Through the courtesy of Mr. Jonathan Hutchinson, jun., I had the good fortune to examine two other cases of cleft palate in the wards of the London Hospital. The first case is that of a little girl with a complete cleft in the hard palate, which passes out between the left incisor teeth, exactly as in Albrecht's figures. The other is a lad aged

twenty. On the right side he has three incisor teeth, and on the left side three incisors; but the second and third are separated by a very thin fissure. This is also an excellent example, confirmatory of Albrecht's statement. The case has been submitted to operation.

Mr. W. B. Macleod has been kind enough to send me a very instructive cast from a case which occurred in Edinburgh. It shows beyond all question that in this patient the cleft passed between the right central and lateral incisor teeth. This observer also intends, I believe, shortly to publish a series of cases which he has collected, illustrative of the question as to the true position of the cleft.

Magitot, in his well-known "*Traité des Anomalies du Système Dentaire*," refers to many examples of the occurrence of supernumerary incisors in man, and the Museum of this Society also possesses examples of this abnormality in the number of these teeth.

### *Hypertrophied Birds' Beaks.*

Though scarcely coming under the category of teeth, there are one or two facts about birds' beaks which may be worth mentioning.

It is well known that the beaks of many birds, especially those of parrots, undergo hypertrophy after they have lived for some time in captivity. Many years ago, Otto, in his "*Compendium of*

Human and Comparative Pathology," 1831, made mention of, and gave reference to, several interesting examples illustrative of this condition.

Dr. O. Larcher has published a somewhat lengthy "*Mémoire sur les Difformities du Bec chez les Oiseaux*," in which he details several instances in which the beaks of birds of various species have enlarged considerably beyond normal dimensions. So far as my own observations go, I find that parrots and birds of the peacock tribe suffer most. Both mandibles seem equally liable to increase in width, but the upper one is much more liable to be affected in the matter of length.

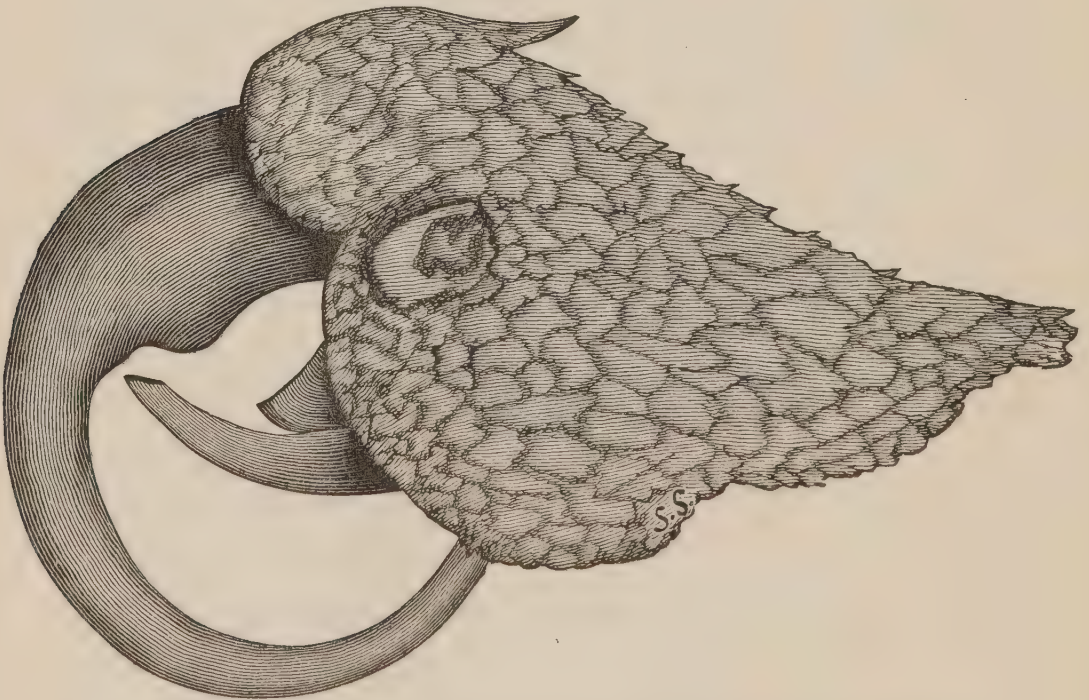


FIG. 11.—Abnormal overgrowth of the beak of a Parrot.

A very remarkable example is represented in



Fig. 11. It is the beak of a parrot which was found in Australia, and my attention was drawn to it by Mr. Clarence Bartlett.

The inferior moiety of the beak measures two inches, but the superior is six inches long, and is curiously curved, and is in close proximity to the bird's throat. It is remarkable that the bird should have lived to allow the beak to get so long, for it is very difficult to see how feeding could be accomplished.

It is interesting to note that in abnormal elongation of the mandibles the upper is always affected to a greater degree than the lower. The reason would seem to be this. When the parts grow abnormally long they tend, like the incisors of rodents, to describe a circle; by this means the edge of the lower beak works against the inner surface of the upper beak, and is thus kept within normal bounds.

This paper must now be brought to a close. But, as material is abundant, I hope before long to bring some further researches in "Comparative Dental Pathology" under the notice of this Society.

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## DISCUSSION.

The PRESIDENT said Mr. Sutton had on several previous occasions read very interesting papers before the Society, but it was evident that he had not yet exhausted his subjects, for the paper they had just heard was as full of instructive matter, and presented as many interesting points for discussion, as any of the others. He quite agreed with Mr. Sutton that it was not wise to rely too much on pathological conditions as a foundation for theories on the subject of normal anatomical or physiological processes. One of the most interesting points in the paper was Mr. Sutton's suggestion as to the causes of cleft palate, and it was the more so because it was probable that the same causes which thus led to an imperfect maxilla in the offspring might also produce defective teeth.

MR. CHARTERS WHITE asked whether it had ever been ascertained why the tusks of animals always showed a tendency to form a curve? Was it due to the same cause which produced the curly hair of the negro? In that case the bulbs were curved, and so the hair was developed in a curved direction.

MR. GADDES remarked that Mr. Sutton's paper was evidently the outcome of much patient inquiry, and he assuredly deserved the best thanks of the Society for the time and labour he had bestowed on the investigation of a subject which was so interesting to them. He might mention that there was in the Museum of the National Dental Hospital the lower jaw of a kangaroo which showed that some injury had been done to the persistent pulp of one of the lower incisors, and an abscess had followed with results very similar to those which existed in one of the cases mentioned by Mr. Sutton. With reference to what had been said about the curved tusks

of animals, it was evident that this was a useful provision of nature, the curve lessening the shock on the socket, and protecting the pulp from the effects of violent impact. The long straight tusk of the narwhal was a notable exception, but in this case the same end was attained in another way; for it had a spiral or screw-like twist, and it was well known that force applied to the head of a screw was not transmitted directly to the point, but was to a great extent lost in a direction at a right angle to the axis. Lastly, he would remark that the case of the marmoset described by Mr. Sutton appeared to resemble very closely the disease known in the human subject by the name of *pyorrhæa alveolaris*.

MR. STORER BENNETT said he regretted very much that Mr. Oakley Coles was not present. He had studied the subject of cleft palate thoroughly, and would probably have been able to give some valuable information with reference to the points touched upon by Mr. Sutton. He himself could not help thinking it odd that if three incisors were normal in the upper jaw, no trace of the extra teeth should ever be found in the lower. The usual statement with regard to the tusks of animals being curved was that mentioned by Mr. Gaddes, viz., that they were so in order to protect the pulp from injury, and the idea was by no means a new one. Mr. Sutton had compared the change in the direction of the tusks of some animals which was caused by their rubbing them against the walls of their cage, to the treatment of irregularities by the dental practitioner by means of the pressure of a plate. But the cases were not exactly parallel. In the one case the socket was larger than the tooth, and the tooth was twisted in its socket. In the other the pressure caused absorption of the bony wall of the socket at one point, and then a redeposit of bone took place at another. Some of the other morbid conditions mentioned by him did, however, very closely resemble what was met with in the human subject. Thus in gouty people it was not uncommon for sound teeth to be lost owing to absorption of their alveoli. The peculiar white softening of teeth which he mentioned



was also sometimes met with, especially in persons who had suffered from some exhausting disease, and it was found that if the disease did not last very long redeposition of salts might take place.

MR. SUTTON, in reply, said that the so-called explanation of why the tusks of animals were curved had first been offered by Professor Owen. But, although it pointed out one of the purposes served by this particular shape, it did not really explain how it was that the teeth became so, and he (Mr. Sutton) could not offer any satisfactory explanation. Curved teeth and curled hair, however, were not analogous. The morbid condition of the teeth which he had described in the case of the marmoset was very common amongst animals which were kept in captivity, far more so than that characterised by the presence of tartar.

He thanked the President for the kind way in which he had spoken of himself and his papers, and he begged to offer for the benefit of the Museum, if the Society would accept them, all the specimens he had brought with him that evening to illustrate his paper. He wished in this way to make some return for the liberality the Society had shown in the illustration of his papers.

The PRESIDENT said he thanked Mr. Sutton most heartily in the name of the Society for his valuable donation, and also for his very interesting paper. A paper from him annually seemed to have become a sort of institution, and he hoped it would continue to be so. Their thanks were also due to Messrs. McAdam, Coffin, Oakley Coles, and especially to Dr. St. George Elliott for another valuable addition to the Museum. He had only, in conclusion, to remind the members that the Annual Meeting would take place on January 12th, when, in addition to the usual business of that meeting, Mr. Storer Bennett would read a paper on "The Herbst Method of Gold-filling."

The Society then adjourned.

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# Odontological Society of Great Britain.

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## ANNUAL GENERAL MEETING.

*Monday, January 12th, 1885.*

J. S. TURNER, M.R.C.S., L.D.S.ENG.,

PRESIDENT, IN THE CHAIR.

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THE Minutes of the previous meeting having been read and confirmed,

THE PRESIDENT declared the ballot open for the election of the office-bearers of the Society for the current year.

MESSRS. A. C. HARRIS and W. H. WOODRUFF were then chosen in the manner prescribed by the bye-laws to act as scrutineers of the ballot.

The following candidates were then balloted for and elected Non-resident Members of the Society, viz. :—

MESSRS. JOHN BROOKS BRIDGMAN, L.D.S.I., St. Giles' Street, Norwich;

JOHN ALEXANDER FOTHERGILL, M.R.C.S. and L.D.S.Eng., D.D.S. Univ. Pennsylvania, Northgate, Darlington; and

ALEXANDER KIRBY, L.D.S.Eng., 8, Harper Place, Bedford.

THE PRESIDENT then called upon the Treasurer for his report.

FINANCIAL STATEMENT.

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MR. PARKINSON said it would be remembered that the balance sheet he had presented at the last Annual Meeting showed a deficit of about £36. This year the total receipts had amounted to the sum of £603 1s. 10*d.*, and the total expenditure to £462 16s. 3*d.*, leaving a balance in hand of £140 5s. 7*d.* A considerable portion of this sum (£86) was, however, made up of arrears of subscriptions which had been recovered, and of entrance fees which should have been received in the previous year. The total assets of the Society invested at interest and at the bank amounted to £2,453 10s. 8*d.* The Society now numbered 318 members, as against 333 last year, exclusive of 43 honorary members, only 7 new members having been elected during the year, as against 25 in 1883, and 21 in 1882. This was a very serious falling off, but in other respects he thought his report might be considered satisfactory.

The usual detailed statement of accounts is subjoined.



*The Treasurer in Account with THE ODONTOLOGICAL SOCIETY OF GREAT BRITAIN,  
for the Session 1883-84.*

DR.				CR.			
		£	s. d.			£	s. d.
To Annual Subscriptions ..	..	..	422 11 0	By Printing and Publishing the "Transactions" ..	..	..	120 4 6
Entrance Fees ..	..	..	31 10 0	Postage of "Transactions" ..	..	..	15 1 1
Arrears of Subscriptions ..	..	..	68 5 0	Woodbury portraits, &c... ..	..	..	11 3 11
Sale of "Transactions" ..	..	..	24 18 0	Woodcuts.. ..	..	..	3 13 0
Interest on Stock ..	..	..	38 0 4	Reporting .. ..	..	..	23 2 0
Interest on £550 (one year) ..	..	..	17 17 6	Sundry Printing .. ..	..	..	31 8 6
				Refreshments .. ..	..	..	25 6 0
				Rent (one year) .. ..	..	..	105 0 0
				Library .. ..	..	..	9 14 7
				Museum .. ..	..	..	47 0 6
				Postage .. ..	..	..	7 19 10
				Purchase of Stock .. ..	..	..	38 0 4
				Sundries .. ..	..	..	25 2 0
				Balance .. ..	..	..	140 5 7
						£603 1 10	

G. F. CORBETT, }  
WALTER COFFIN, } *Auditors.*

JAS PARKINSON, *Hon. Treasurer.*

1883-84.	£	s.	d.
Gross Receipts .. .. .	603	1	10
Gross Disbursements .. .. .	462	16	3
Surplus over Expenditure .. .. .	£140	5	7
Cash at Bank, and in Treasurer's hands 31st October, 1883	425	11	5
Surplus, 31st October, 1884.. .. .	140	5	7
	£565	17	0

*Assets of the Society, 31st October, 1884.*

Stock, New Three Per Cents. .. .. .	1,337	13	8
Cash at interest .. .. .	550	0	0
Cash at Bank, and in Treasurer's hands .. .. .	565	17	0
	£2,453	10	8

New Members—	Total.
Resident .. .. .	1 }
Non-Resident .. .. .	6 } 7
Resignations—	
Resident .. .. .	4 }
Non-Resident .. .. .	2 } 6
Deaths—	
Non-Resident .. .. .	3.. 3
Removals—	
Resident .. .. .	1 }
Non-Resident .. .. .	2 } 3
Members in arrear—	
Resident .. .. .	5 }
Non-Resident .. .. .	19 } 24
Number of Members—	
Resident .. .. .	122 }
Non-Resident .. .. .	196 } 318
Honorary, &c. .. .. .	43.. 43

MR. WEISS (Librarian) reported that during the past year no less than 42 members of the Society had made use of the books in the Library, and 65 students had also availed themselves of this privilege. More books had been borrowed

during 1884 than in any previous year, and he was glad to be able to say they had been returned with creditable punctuality. Arrangements had recently been made to ensure a satisfactory number of exchanges, so that current dental literature might be well represented in the collection. Independent of these exchanges, amounting to 18 numbers a month, 23 volumes had been added to the Library during the year, viz.:—12 vols. of English books, 3 of American, 7 of French, and 1 German.

He hoped members would not forget that on Wednesday evenings, from six to eight, the reading-room was open for their use, and that Mr. Camps, who was acting as Sub-Librarian with great diligence, would be ready to furnish them with any works they might wish to refer to.

MR. S. J. HUTCHINSON (Curator) reported that since the last catalogue was published, in January, 1882, a hundred and twenty-five specimens had been added to the museum, being an average of five specimens for each meeting of the Society which had been held since that date. These had all been arranged in a supplementary catalogue, which would be issued with the January number of the Transactions, and in the preparation of which he had received most valuable assistance from Mr. Willoughby Weiss, to whom he took that opportunity of expressing his thanks. Great care had been taken that the names of the donors of these specimens should be correctly entered in this catalogue, but if any mistakes should be detected he hoped that notice would at once be sent him. He believed the Society's Museum was now, as an odontological collection, second to none, and he hoped that members, by a continuance of their donations, would long maintain it in that position. He could not conclude without alluding to the valuable contributions recently made by Mr. Bland Sutton, which, however, had not exhausted his generosity, for he promised yet further additions.



MR. HUTCHINSON then exhibited a very interesting specimen just presented by Mr. Paxton Harding, showing two supernumerary upper lateral incisors. On one side the two laterals were placed side by side, one being behind the central and the other behind the canine; on the other side one occupied the usual position, and the other was behind it. He believed the specimen to be almost unique.

MR. OAKLEY COLES showed a curious wooden instrument which he said was used by the natives of the Congo as a tooth-brush.

He also showed an adjustable stool, invented by Mr. Henry Greenfield, which he had found very comfortable and useful in his practice.

The PRESIDENT remarked with reference to the instrument that though it might serve the purpose of a tooth-pick or scraper, it bore no resemblance to a brush, and he thought that that was scarcely a correct designation for it.

MR. STORER BENNETT showed a gorilla's skull which had been lent to him for exhibition. It presented evidence of considerable injury to the facial bones received during life. The upper incisors had been lost, and their sockets absorbed; the nares had also been damaged, especially on the right side, and the right zygomatic arch had been fractured. But a still more interesting peculiarity was the presence of a supernumerary tooth on the inside of the ascending ramus of the lower jaw on the right side.

The PRESIDENT remarked that the condition of the nasal bones looked to him more like the result of disease than of injury. The situation of the supernumerary tooth was certainly very remarkable.

MR. D. HEPBURN then read the following communication from Dr. E. A. Bogue, of New York, observing that he considered the instrument therein described a very ingenious one, and well worthy of the attention of members.

MR. PRESIDENT AND GENTLEMEN OF THE ODONTOLOGICAL SOCIETY  
OF GREAT BRITAIN.

I BELIEVE it is generally conceded that the normal form and position of the human teeth are such as are best calculated to resist the destructive tendencies which surround them. When, however, decay has attacked the teeth upon their approximal sides, the difficulties of restoration to the normal form have been so great as to discourage many from ever undertaking it. The consequence has been that, for obtaining access to very small cavities of decay, great slots, or V-shaped spaces, have often been filed between two teeth, which slots have afterwards been receptacles for the *débris* of food and the nidus of decay. A more careful class of operators have used wedges of cotton, tape, or wood, until space was procured, and then placed a wooden wedge at the margin of the gum between the two teeth to be operated upon. This process is both long and painful, and is not always certain.

Some ten or twelve years ago, Dr. Jarvis, of New York, devised an instrument to separate two adjoining teeth by means of a screw, so that an examination could be made or a wedge inserted.

Shortly afterwards, Dr. Perry made an improvement upon the form of the instrument, but it was still not applicable to the majority of cases.

With the consent of both these gentlemen I have undertaken to improve the device still further, and this evening take pleasure in presenting for your examination an instrument that I have used for the last four years, with great advantage to myself and an enormous saving of pain and tooth substance to my patients. I have recently made some further modifications in the form and size of the instrument, that are shown in the accompanying engravings.

It is a question of applying the force gradually, to separate the teeth without touching the gums, in order to obtain, little by little, the necessary space, and, once obtained, to have room enough to work without being hindered by the instrument itself.

If we examine the dental arches of a well-developed subject, looking at the maxilla horizontally, we find that the arch of the lower jaw presents three different curves.

FIG. 1.



The first (fig. 1) is represented by a line commencing at the upper end of each canine and describing a curve that is convex towards the upper jaw ; the two other curves are indicated by the molars, which



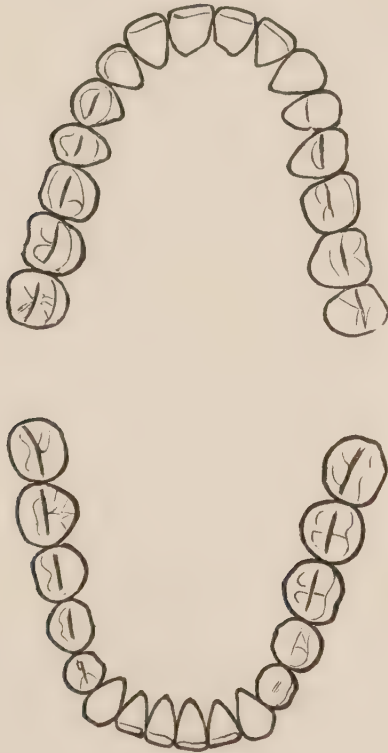
present a curve with the concavity looking downwards (fig. 2).

FIG. 2.



In the upper jaw the same curves exist, but reversed; and we have besides a curve from one canine to the other which is convex on the labial side, while the molars have, on the contrary, a concave curve (fig. 3).

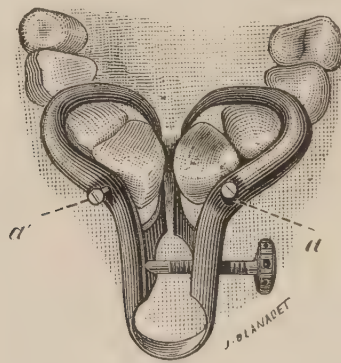
FIG. 3.



It must be remembered also that the length of the teeth varies considerably in different indi-

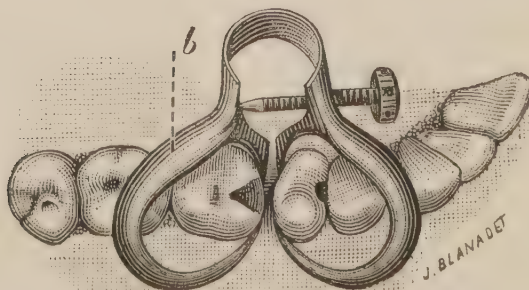
viduals. For these various reasons it is easy to understand the difficulties in the way of a perfect adaptation of the instrument to all mouths ; hence the advisability of having several to suit different cases. I enclose several illustrations of the instrument in position upon various teeth.

FIG. 4.



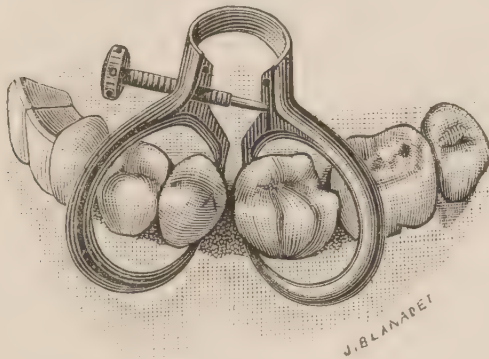
The one upon the incisors (fig. 4) has two small screws to adapt it to the varying lengths of teeth, and so to raise the instrument, by letting these small screws press upon the ends of the teeth, that the points of the separating claws shall not impinge upon the gums.

FIG. 5.



The one showing the cavities in the molar and bicuspid (fig. 5) is shaped so as to rest upon the ends of the teeth, and the pointed ends of the claw are just the length of a short tooth below the middle of the bow.

FIG. 6.



The last illustration (fig. 6) shows a wider bow farther removed from the cavity to be operated upon, and out of the way of all instruments, with the points of the claws a little further from the middle of the bow, thus adapting it to lower back teeth and to long upper teeth. The distance between the points of the claws varies according to the class of teeth it is to be used upon ; for incisors the points would have to be from 4 to 5 millimetres apart, while for molars they might need to be 7 or 9 millimetres, or even more in some cases.

I find that in many cases, if the teeth to be operated upon can be separated with cotton or tape for one or two or more days before the operation, the screw separator being then applied



holds them steadily and firmly while the operation is being performed, and so painlessly that patients often go to sleep during the operation. Of course one is thus enabled to go on much more rapidly, and with less fatigue to both parties. When the fillings are in, another turn is given to the screw and room obtained to finish the cervical margins by means of Dr. Smith's discs, that cut only upon the outer edge, and by the use of polishing tapes and sharp lancets. Upon taking off the separator, there remain two knuckles of gold or other filling that touch each other like two apples side by side, over which the floss silk and the brush can pass readily to completely cleanse the entire circumference of the filling, while these two contiguous fillings, restoring the original or the ideal form of the tooth, effectually prevent the disagreeable or painful crowding of food between the teeth and under the gums, to their detriment.

E. A. BOGUE.

29, *East 20th Street, New York.*

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The PRESIDENT said he had been informed by Dr. Bogue that the instrument then being handed round had not been made quite according to his instructions, but that he would send a better specimen as soon as he could get one made.

He then called upon Mr. Storer Bennett to read his paper on "The Herbst Method of Gold-filling."

*On Herbst's Method of Gold-filling by Rotating  
Burnishers.*

BY STORER BENNETT, F.R.C.S. & L.D.S. ENG., L.R.C.P.LOND.

MR. PRESIDENT AND GENTLEMEN,

IN the April number of the Journal of the British Dental Association for last year appeared an article on a method of filling teeth with soft gold by means of burnishers rotating in the burring engine, introduced to the profession by Dr. Herbst of Bremen. But little notice was taken of the subject until towards the end of the summer, when Dr. Herbst's brother visited England, and gave a demonstration at the Dental Hospital of London. The occasion was inopportune, as most of us were already away, or just starting for the autumn vacation, so the subject again received but scant attention. Later in the year I made a series of experiments, which proved so far satisfactory that I considered it desirable the subject should be brought before this Society, that its merits might be discussed, and the various experiences of those who had tried it be obtained.

Dr. Herbst claims for his method that by its use we can obtain a solid, hard gold-filling, with

more perfect adaptation of the gold to the walls of the cavity, with greater ease, and a far less expenditure of time than by any other method; and as he has worked on this plan for six years it is to be presumed he feels satisfied as regards the test of time.

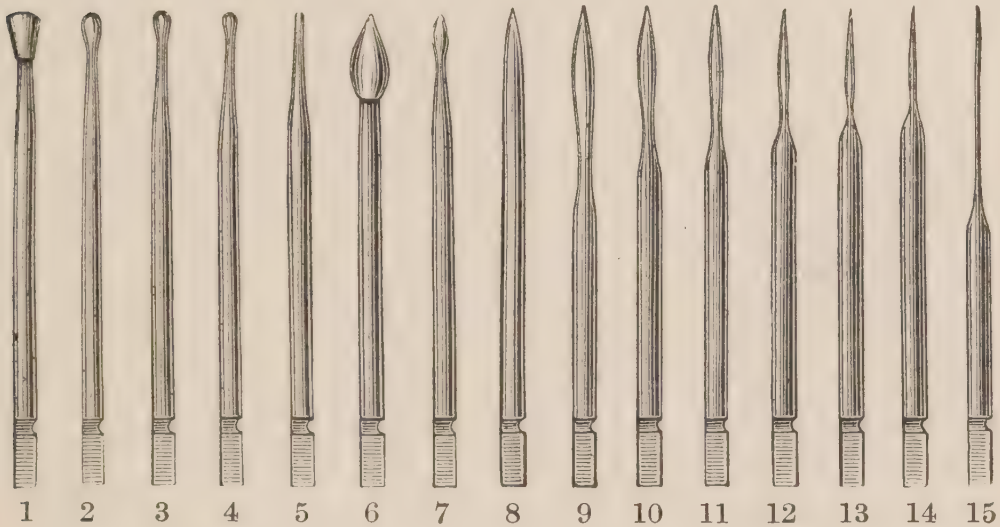
During the process of filling it is necessary to have four walls to the cavity, and where these do not exist already they are temporarily supplied by means of a matrix. Large soft cylinders are employed, and packed into the cavity unannealed, becoming cohesive during the course of manipulation. And herein lies the greatest peculiarity of the process; for by other methods we introduce into the cavity gold which is already cohesive, but here we introduce soft cylinders which when pressed together show no tendency whatever to cohere, yet, in the course of a few revolutions of the burnisher, become coherent and welded into a solid mass, like a piece of cast metal.

The instruments employed consist of various sized and shaped burnishers, worked by the burring engine, and of the following forms.

They are numbered from 1 to 15. No. 1 is a large inverted cone; 2, 3, and 4 are large pear-shaped points, all highly polished. No. 5 is ground to a blunt ("roof-form") point, but this must not be polished, but simply finished on an Arkansas stone; as this instrument is much employed, two



or three sizes of it are desirable. The remaining instruments, from 6 to 14 inclusive, are polishers



used in finishing fillings. No. 15 is a needle for a special purpose to be described hereafter.

A cavity is prepared in the usual way, care being taken that its interior is larger than its entrance; undercuts may be made if convenient, but are not essential, and no retaining points are required; the edges of the enamel, though smoothed and polished, should not be bevelled, but left quite square.

In filling a cavity, take for instance the distal surface of a second upper bicuspid, with the masticating surface also involved. Such a cavity by the ordinary method would be filled cohesively from the beginning, and built up in order to reproduce the contour. By the addition of a matrix the distal wall is restored, and we have now to

treat a simple crown cavity. This matrix (which is best formed of a piece of clock spring deeper than the cavity) is wedged between the bicuspid and first molar, if that is standing, and secured by two pins, jamming it as tightly as possible. It is essential that the matrix be perfectly firm and steady, or the filling will be unsound.

The tooth being prepared, the rubber-dam applied, and the matrix in position, the cavity is loosely filled with the largest cylinders that can be conveniently introduced, and the largest burnisher selected that the mouth of the cavity will admit. By slow rotation of this instrument in the engine, and the exercise of moderately firm and steady pressure, the gold is squeezed towards the floor and sides of the cavity, acquiring as it is compressed a brightly polished non-cohesive surface. If it is found that the gold rolls beneath the burnisher, it is because too few cylinders have been introduced, and more must be added, or because too small a burnisher is being employed. If sufficient gold is placed in the cavity, and a large burnisher used, the gold will not roll, and it is of course essential that this, the base on to which all the subsequent filling is built, should be absolutely steady and immovable.

The burnisher is now changed, and a No. 5 point, not too small in size, and which it will be remembered is left unpolished, is substituted. This is

very rapidly rotated with moderate pressure, and the gold *prodded* by it, if I may be permitted the expression, as it exactly conveys my meaning. The whole of the filling must be gone over in this manner, especial care being taken that the gold is thoroughly driven down to the cervical edge towards the matrix, for here if anywhere will be the weak place when the filling is complete.

The rapid rotation causes the gold to be still more condensed than it was at first, to lose its polish, and become converted into a hard and solid mass of cohesive gold. This may be readily proved, for on a soft unannealed cylinder being lightly pressed on to its surface, and then an attempt made to lift it away with the foil-pliers, the cylinder will be found to tear in half, rather than leave the surface to which it has become closely coherent.

The cavity must again be loosely filled with cylinders, and these treated in a similar manner to the former ones, first the large burnisher being used, and then the No. 5, and so on with more and more cylinders until the cavity is quite full, when the matrix may be removed, and the filling smoothed and polished in the usual manner, where necessary.

But little finishing, however, will be required if the matrix has been adapted closely to the cervical



and lateral margins of the cavity, and in this way much time and trouble are saved.

During the process of filling it will be noticed that the burnishers become coated with gold, which may be cleaned off by rotating on a piece of emery paper, the large ones on very fine, and the No. 5 on somewhat coarse paper; or, better still, they may be cleaned by being pressed while rotating on a block of pure tin. A little of the tin is apt to be conveyed to the filling, but it does not appear to affect either its working quality or its colour.

Care must be taken that the instruments be not kept too long in contact with the gold, or the filling will soon become very hot and painful to the patient.

Occasionally, if the pressure be retained too long, the gold acquires a highly polished surface, which cannot be made cohesive in the ordinary way; this may be overcome by rapidly rotating on it a fine cut burr such as is used for dressing down fillings; this tears up the polished surface, and leaves a perfectly cohesive one in its place; the filling may then be proceeded with in the ordinary manner.

It is in all cases desirable that the matrix should extend well beyond the margins of the cavity, both towards the cervical edge and the grinding surface. Unless it extends beyond the

cervical edge it is apt to catch in this part of the tooth, and a ledge of uncovered dentine will here be left when the filling is finished. If it does not extend beyond the grinding surface it will be found a very slow and difficult process to apply the last layers of gold, but not so if the matrix is made sufficiently deep. This is a matter of the greatest importance, and Dr. Bödecker, in an admirable article in the "Independent Practitioner," which was reproduced in the November number of the Journal of the British Dental Association, and which I cordially commend to your notice, says: "The adjustment of the last layers of gold requires almost as much time as when made by the mallet." In my earlier experiments I was inclined to agree with Dr. Bödecker in this view, but subsequently I increased the depth of my matrices; from that time the difficulty disappeared, and I now find it almost as easy to put on and finish the last pieces of gold as the first ones.

When a corner of a tooth, as for instance an upper incisor, is to be restored, a somewhat different method must be adopted for applying a matrix. Here, however, the same general principles for filling will be observed, viz., the cavity must be smaller at its entrance than its interior, and four walls must be provided, since they do not exist already.

These artificial and temporary walls may be formed by imbedding the tooth and two or three adjoining it in softened shellac, brought well over the cutting edges of the teeth and between them, so as to afford as much support as possible. Should any shellac have oozed into the cavity it may be removed when cold by the aid of an excavator. When it is possible, however, it is eminently desirable that the walls should be formed of metal, such as clock spring or platinum foil, which can be moulded to the shape of the tooth in the form of a collar, and soldered or not, as may best suit the case, being subsequently imbedded in the shellac. The metal gives an increased support, and prevents the heat which is apt to be generated in working softening the shellac and causing the gold to sink into it and become spongy and porous. Should this happen, it will be found that a portion of the gold comes away from the filling and attached to the shellac when the matrix is removed.

When two interstitial cavities in front teeth are to be filled, they are separated sufficiently to allow a thin dividing file to pass between them, on more room being necessary; they are excavated and as good a hold obtained in each as required, then a few cylinders are packed in one cavity and condensed, &c., as previously described, the process being repeated in the other tooth, more gold is



added, until finally the two cavities are united, one filling stretching across and occupying both teeth.

When the cavities are quite full, the point of instrument No. 15, which is a clean smooth sewing needle set in a socket, is placed on the gold in the interval between the two teeth, and by slow rotation and steady pressure passed right through the gold, first near the gum, then near the cutting edge, then between the two; more holes are now drilled if necessary, and finally they are joined by means of a saw or fine file. The two fillings are now finished in the usual manner.

In using the needle, care must be taken that it is passed backwards exactly in the right direction, or it is apt to be driven into one of the cavities instead of between them. These needles are readily renewed when broken, as they are merely fastened into the socket of the holder by shellac or soft solder.

It will be noticed by this method of filling that soft, unannealed, non-cohesive cylinders are introduced into the cavity, and by subsequent working are converted into a mass of cohesive gold. This effects an immense saving of time, as we are thereby enabled to use large cylinders and several at once; for being soft they are readily adapted to the walls and floor of the cavity, whereas by our ordinary method we can only use small pieces of

gold, and one piece at a time ; if we attempt to pack a large cylinder which has been annealed we find it becomes hard on the exterior and spongy within. The difference being that one is heated before any attempt is made to adapt it to the walls of the cavity, and the other becomes cohesive only subsequently to the adaptation having been produced.

This adaptation of the gold to the walls of a cavity is very perfect, as will be noticed when a tooth is split open, for every little hollow and depression will be found perfectly reproduced ; the centrifugal force of the rotating burnisher having driven the gold before it into every hollow and crevice presented to it.

On splitting open a tooth and removing the filling, the gold will be found quite solid and incapable of breaking up by pressure between the fingers, and may be beaten on an anvil into a thin sheet without splitting, showing that the component cylinders are not mechanically pressed together, but actually welded into a homogeneous mass.

I have used this means of filling in the case of several patients who have previously had teeth stopped by the aid of the mallet, and they all express a preference for the new method, as it saves the jarring which is so painful where teeth have been separated.

Dr. Herbst invariably employs cylinders prepared by a German manufacturer, Carl Wolrab, of Bremen, which seem admirably adapted to this kind of work, and I believe much of our success will depend on their employment ; no other gold I have met with appears to possess such a softness and adaptability as this, though the soft cylinders sold by some of our makers also work extremely well.

Should a filling become damp before it is completed, it may be dried as far as possible by the ordinary means, and if a burnisher to which some gold is allowed still to cling is rapidly rotated over its surface for a short time, sufficient heat is generated to perfectly dry it and enable one to proceed with the filling to its completion.

There is an undoubted waste of time in changing the points so frequently, and I think it very desirable that some means be introduced to overcome this difficulty, such as the employment of two engines or two arms working on one engine, or better still, an electric motor for working the No. 5 point, which requires rapid rotation with but little pressure. It would also save the fatigue which is experienced from a prolonged use of the burring engine.

*Tin-foil* may be worked in a similar manner to gold ; from its natural softness it easily adapts itself to the walls of the cavity, and readily



coheres when a burnisher is rotated against it; when beaten on an anvil, like gold, it may be flattened without splitting, showing how intimate is the union between its component portions.

From the ease with which it packs, it is more rapidly worked than gold.

Gold is readily built on to tin; a filling may thus be partly built up with tin and completed with gold in such parts as are subject to the greatest amount of wear.

I have been unable to obtain any cohesion with platinum leaf when worked in a similar manner.

Burnishers made of agate answer admirably for compressing the gold, and possess the advantage of not becoming coated with the metal; they are, however, difficult to obtain, and readily break, so that I have been reluctantly compelled almost to abandon their use.

To summarize my remarks, I would say that by this method we possess a very rapid, and I hope reliable, method of filling those long and somewhat difficult cavities in teeth where, one or more of the walls being absent, we are compelled to resort to cohesive filling for restoration of the missing portion.

The method is easy when one is accustomed to it, the most troublesome part being the accurate adaptation of a satisfactory matrix, though this and other difficulties rapidly disappear after a little practice.

Too much attention cannot be paid to the matrix extending well beyond the margins of the cavity.

Great care is necessary that the gold be well compressed towards the cervical edge where it and the matrix join, for this is the most critical part of the whole filling.

Should the gold rock, it is due to too few cylinders being in the cavity, or too small a burnisher being used to start with ; probably the former is the fault.

Though the cylinders are soft and non-cohesive, they must not be annealed.

When possible, a layer of metal should always intervene between the gold and shellac matrix.

Should the gold remain polished and refuse to become cohesive, a fine cut burr rapidly rotated over it will immediately convert the surface into a cohesive one.

To those who may be interested in the subject I strongly commend the perusal of the articles by Dr. Herbst and by Dr. Bödecker.

In conclusion, I beg in support of my remarks to submit for your inspection a few specimens of the fillings which have formed the subject of my experiments, merely observing that any imperfections noticed in them are due rather to my want of familiarity with the method than to any inherent fault in the system.

## 102 ON HERBST'S METHOD OF GOLD-FILLING

The following specimens were exhibited during and after the reading of the paper:—

1. Dr. Herbst's set of 15 rotation burnishers for the engine.
2. Wolrab's and Jamieson's soft gold cylinders.
3. Molar with large cavity occupying masticating and distal surfaces filled by rotation with Jamieson's gold. The tooth and filling are sawn through vertically. The matrix not having been carried low enough had caught at the cervical edge, leaving a ledge of uncovered dentine at this spot.
4. Shellac matrix used in filling the right upper central and lateral teeth of a patient exhibited after the meeting. The shellac became softened at one point during use, and yielding, allowed the gold to sink into it, and become spongy, a portion of it (*shown*) coming away attached to the shellac. This accident suggested the use of a thin layer of metallic matrix between the shellac and gold.
5. A large cavity in a molar had been prepared with numerous pits and grooves, and filled with gold by rotation; the tooth was split up and the filling exhibited, in order that the close adaptation of the gold to the inequalities might be noticed.
6. Two specimens of Wolrab's gold which had filled a tooth; the fillings were removed and beaten out on an anvil to show their malleability, and how intimately welded the mass had become.
7. A similar specimen of Jamieson's gold removed and beaten out.
8. Large cavity in masticating and distal surface of molar filled with Wolrab's gold; the introduction of the gold occupied 40 minutes.
9. Outer fourth of upper central incisor built up with Wolrab's gold, restoring the labial, palatine, and distal surfaces, and the cutting edge.
10. Cavity in masticating and distal surfaces of bicuspid



filled with Jamieson's gold. Tooth and filling cut through vertically.

11. Large cavity on masticating and distal surface of molar filled with tin cylinders and sawn through vertically; the cervical wall of filling was left untouched after the removal of the matrix, in order that the character of surface left by it might be seen. Time of introducing the tin, 21 minutes.
12. Large tin filling, restoring masticating and distal surface of molar; tooth and filling sawn through vertically.
13. Half of No. 12 removed and beaten out.
14. Tin filling in lower molar masticating and distal surface. Tooth and filling sawn through vertically. Time in introducing the tin, 25 minutes.
15. Combination filling of *tin and gold*. Large cavity in masticating and distal surface of upper molar, three parts filled with tin occupying 10 minutes, and finished with Wolrab's gold occupying 12 minutes. Together 22 minutes.
16. Shellac and platinum matrix adapted to three upper front teeth, for restoration of distal corner of left upper central. Arranged so that the filling can be made from the *front*.
17. Similar matrix adapted to distal corner of right upper canine, so the filling can be performed at the *back*.
18. Clock spring matrix wedged between second upper bicuspid and first molar, for restoration of the distal and masticating surface of the bicuspid.
19. Clock spring collar surrounding molar, adapted to a case where there is no contiguous tooth against which a matrix can be wedged.
20. *Patient exhibited*.—W. R., æt. 22. Frail teeth. Proximal sides of right upper central and lateral incisors restored. The enamel was very thin and chalky. The palatine, proximal, and labial walls were built up. Shellac matrix used which became soft, allowing the gold to become spongy at one part,

and needing extra gold to be added at the last. This matrix is described as No. 4 in this list. Time for the two fillings, 45 minutes.

21. Mesial surface of right upper central. The teeth were very close together, and were just wedged sufficiently at the time of operation to admit a thin dividing file. Time, 8 minutes.
22. Two shallow cavities in proximal surfaces of left upper central and lateral. No wedging. Time, 16 minutes the two.
23. Anterior surface of first left upper bicuspid, the cavity also involving the masticating surface. Clock spring matrix used. Time, 18 minutes.
24. Proximal surfaces of first and second left upper bicuspid. Clock spring matrix. The first bicuspid occupied 8 minutes, and the second 10 minutes.

Wolrab's gold was used for all the fillings in this patient.

NOTE.—Wherever the time is mentioned it applies only to that of introducing the filling, as that is the special part to be noted; the preparation of a cavity and finishing a filling being carried out in the ordinary manner are therefore not noted.

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## DISCUSSION.

MR. VASEY asked if Mr. Bennett could explain how the non-cohesive foil became cohesive during this process? Was it due to the heat evolved by the friction of the burnisher?

MR. OAKLEY COLES said that about six or seven years ago he tried some experiments in packing cohesive gold by means of the engine; but his idea had been to consolidate the gold by means of a revolving instrument giving a rapid succession of blows. For this purpose he had used a burnisher with rounded interrupted facets, somewhat resembling a tomato, and with this he was able, out of the mouth, to get very good solid fillings. There could, however, be no doubt that the cohesive quality of gold could be very quickly evolved by the heat generated by the rapid rotation of a perfectly smooth instrument, though he had not thought of this when he made his experiments. He considered that the profession was greatly indebted to Dr. Herbst for calling attention to this fact, and that the Society was much indebted to Mr. Bennett for bringing Dr. Herbst's discovery so clearly before it. The cohesive property of gold under certain conditions was, of course, no recent discovery; it had been known for thousands of years. But this mode of evolving it, and of securing condensation at the same time, was a novel application of known principles for which Dr. Herbst deserved all the credit.

MR. HUTCHINSON thought Mr. Bennett's paper very clear and practical, but a still clearer idea of the process would be obtained if at the close of the meeting he would have an engine brought in and give a short demonstration of the principal points. Thus he had said that when the cylinders were first introduced, the engine was to be worked "slowly." How slowly? And afterwards that the point of the instrument was to be alternately applied to the gold and then removed,



and that it must not be kept in contact too long. All these points could be shown in one minute by practical demonstration, whilst the mere verbal description of them did not convey a sufficiently definite idea.

Mr. Bennett had said that the most troublesome part of the process was the application of the matrix. He (Mr. Hutchinson) had been using a very simple matrix, which he believed to be a very decided improvement on the clock-spring, which had to be kept in place by wedges. It was made by breaking a small pen-knife blade with a thick back—a very common one would do—into short lengths. This formed a very perfect matrix, and its wedge-like shape made it very easy to fix in position, as it adapted itself well to the cervical edge; it could be easily bent if heated. It occurred to him, also, that a very simple and ingenious contrivance shown by Mr. Brunton at the meeting of the British Dental Association at Plymouth two years ago would be an improvement on the shellac matrix described by Mr. Bennett. Mr. Brunton's arrangement consisted of a short piece of clock-spring, with the temper taken out of the ends, which were sharply bent on themselves; to these a rubber-dam clamp was attached, and a very efficient and readily applied matrix was thus made when a molar had to be built up.

MR. WALTER COFFIN remarked that the great interest which this process had aroused in the United States might be taken as evidence of its practical value. Dr. Herbst's discovery that soft gold might be rendered cohesive by means of a rotating burnisher was a remarkable one. The value of lining a cavity with soft gold had long been appreciated by the best operators, and the difficulty hitherto experienced in attaching cohesive gold, in order to finish with hard contour work, would appear to be greatly lessened by this very important observation.

He doubted, however, whether the first layers of soft gold, if applied with the rotating burnisher, would not be rendered less plastic and adaptable to the walls in proportion as it be-

came hard and cohesive under its action. He would therefore like to ask Mr. Bennett whether he did not think that the first layers of gold would be best applied by hand in the usual way?

MR. WEST remarked that, so far as he had heard, this method appeared to be only applicable to easily accessible cavities. He should be glad to know if it could be applied in the case of a cavity requiring a right-angle attachment; such for instance as a buccal cavity in a lower molar?

DR. CUNNINGHAM (Cambridge) said the subject they were discussing was a most interesting one. It appeared to him that Dr. Herbst's discovery was likely to exercise a most important influence on future practice. There were, however, some points which he should be glad to see made clearer. In the first place it seemed curious that only the Bremen gold should give good results. Then he should like to hear a scientific explanation of the statement, that the non-cohesive gold was made cohesive by the action of the revolving bur-nisher. He could not help feeling some doubts as to whether the gold did become cohesive in the sense in which that term was generally understood. No doubt the added gold could be made to adhere to that which had been previously introduced, but there was a difference between adhesion and cohesion. What made him feel more doubtful on this point was the statement in the paper that in certain cases where adhesion could not be obtained, rough-cutting the surface with a bur would make the fresh gold stick. Very likely it did; but this was not what was usually meant when people spoke of gold being made cohesive.

Then it was said that Dr. Herbst had been at work on this system for six years, and he brought forward clock-spring as the best form of matrix which he could suggest. It appeared to him (Dr. Cunningham) that Dr. Herbst was rather behind the times. With regard, however, to Mr. Brunton's clamp, referred to by Mr. Hutchinson, it was unfortunately only applicable in certain cases. He (Dr. Cunningham) would suggest that a good matrix might be made by rolling platinum

foil round the tooth, and securing it with a rubber-dam clamp. Possibly also some of the modelling compositions, such as the Al impression material, might do instead of shellac. He thought that Mr. Bennett might have subjected his fillings to some better test than merely beating them out on an anvil. It would be interesting, for instance, to compare the specific gravity of one of Dr. Herbst's fillings with that of one made by other methods. Had Mr. Bennett tried the Bremen gold in the ordinary mode of working?

The PRESIDENT said he feared the most important points in the paper were being lost sight of; the precise form of the matrix was not an essential part of Dr. Herbst's method. He hoped that, as the time which could be allotted to the discussion was short, members would confine themselves as much as possible to the subject of the paper, viz., the advantages or disadvantages of filling teeth with soft gold with the aid of rotating points.

Mr. F. J. BENNETT said he quite agreed with what the President had just said; the exact form and material of the matrix was quite a secondary matter. He thought a good deal of what had been said was not very much to the point. Dr. Cunningham had talked about the gold being made to adhere but not to cohere. He (Mr. Bennett) had always understood that the only distinction between adhesion and cohesion was that the latter meant the union of similar bodies, and the former the union of dissimilar; therefore when gold was joined to gold that was cohesion. Mr. Storer Bennett had, he considered, put the subject before them in a very practical form, and the best thing members could do was to go home and try it for themselves.

MR. HERN said he happened to be present when Dr. Herbst's brother gave the demonstration at the Dental Hospital referred to by Mr. Bennett, and he could not say that the results were altogether satisfactory. He noticed that the operator used unannealed cylinders for the deeper part of the cavity, but filled the last third with cohesive gold.



He had since made a few experiments himself, and he found that there was no doubt about the fact that the gold did become thoroughly cohesive as the result of this process. But whatever might be the advantages of this method, its range of adaptability was limited, since it could only be applied to fairly accessible cavities. At all events there was very great difficulty in applying it to cavities which were out of sight, and in using right-angle attachments. It was most useful in cases where the walls of the cavity were frail; it was a great advantage in such cases to avoid blows, and better adaptation of the gold to the walls could be obtained in this way with less pressure. The gain of time appeared to him to be less clear; he thought he could fill a crown filling by hand quite as quickly as with the rotating burnishers. Had Mr. Bennett found that it made any difference which way the instrument was rotated—*i.e.*, from the enamel to the gold, or from the gold to the enamel?

MR. BETTS said that he had only a few days before received a letter from Mr. Chas. Tomes in which he referred to various matters of professional interest which he had met with during his visit to the States. With reference to the subject under discussion he wrote: "About the Herbst method I feel less sure. It easily makes water-tight plugs, and so far is very good, but whether it is better or more rapid than other methods I feel less certain."

The PRESIDENT said it appeared to him that a good deal of the criticism he had heard during the discussion was founded on theory rather than practice. But it was evident that Mr. Bennett had done a large amount of work, and had investigated the matter practically. All new methods presented difficulties, and no doubt the Herbst method was no exception. But Mr. Bennett had shown that these difficulties could be overcome, and he thought that so far as the discussion had gone his verdict would be in favour of the practical success of which the specimens before him were evidence, and against the theoretical objections. He must now ask Mr. Bennett to reply.

MR. BENNETT said his object had been to learn the views of the members with regard to this new method, and in this he had been fairly successful. In reply to Mr. Vasey's question, his opinion was that the gold was rendered cohesive by the heat which was developed during the process of condensing it. The gold certainly did become hot, and if the operator was not careful the tooth might become so hot as to be unbearable and the instrument too hot to be touched. With reference to what had been said about the matrices, he admitted that this was the least developed part of the process; still they answered their purpose sufficiently well, except the shellac matrix, which was certainly not satisfactory; lining it with metal was a decided improvement. In reply to Mr. Coffin's suggestion, that it would be better to line the cavity with soft gold and condense this by hand, after the manner of the best operators, he could only reply that very perfect adaptation of the gold to the walls of the cavity *was* obtained by the Herbst method, as Mr. Coffin might satisfy himself by an examination of some of the specimens exhibited, and that this close adaptation was *not* destroyed by rendering the gold cohesive afterwards. Dr. Bödecker advised that the *last* layers should be made of cohesive gold condensed with the mallet, but Dr. Herbst was in the habit of using soft gold throughout, and all his (Mr. Bennett's) work had been done in this way.

The answer to Mr. West's question was that right-angle attachments could be used. With regard to Mr. Cunningham's remarks, he (Mr. Bennett) had used English gold as well as German, and had found that Jamieson's answered very well, though it was not quite as good, for this purpose, as Wolrab's. As to the distinctions between adhesion and cohesion, he could only repeat that the gold did cohere after using the smooth-cut bur, though it would not do so before. The A 1 impression composition, suggested by Mr. Cunningham for forming matrices would, he thought, be too soft for use in this process.

He did not intend to imply that beating the filling out on an anvil was a conclusive test, still it was of some value. He

might mention, as evidence of durability, that Dr. Herbst's brother had some large gold fillings in his mouth which had been inserted by this method two years before, and they showed no signs of wear. Dr. Bödecker had tested the specific gravity of fillings inserted by this method and with the mallet, and that of the malleted plugs was the higher. Wolrab's gold worked very well when used in the ordinary way. He thought Mr. Hern would find, when he had had more practice at this method of filling, that a decided saving of time was effected by it. He admitted that it might be better to use the ordinary method of filling for inaccessible cavities. He had not found that the direction in which the instrument was rotated made any difference.

The Scrutineers reported that they had examined the voting papers and found that the list of officers recommended by the Council had been unanimously elected. This was as follows :—

## PRESIDENT.

C. Spence Bate, F.R.S.

## VICE-PRESIDENTS.

*Resident*, T. Charters White, George Gregson, and  
Henry Sewill.

*Non-resident*, J. T. Browne-Mason (Exeter), Richard  
White (Norwich), Andrew Wilson (Edinburgh).

## TREASURER.

James Parkinson.

## LIBRARIAN.

Felix Weiss.

## CURATOR.

S. J. Hutchinson.

## EDITOR OF THE TRANSACTIONS.

J. Oakley Coles.



## HONORARY SECRETARIES.

David Hepburn (*Council*), Robert Woodhouse (*Society*),  
and Storer Bennett (*Foreign Correspondence*.)

## COUNCILLORS.

*Resident*, F. Canton, Alex. Cartwright, Chas. S. Tomes, Wm.  
St. George Elliott, Augustus Winterbottom, Samuel  
Cartwright, A. Morton Smale, J. Howard Mummery,  
Arthur S. Underwood.

*Non-resident*, J. F. Cole (Ipswich), G. C. McAdam (Hereford),  
W. E. Harding (Shrewsbury), Robert Reid (Edinburgh),  
J. R. Brownlie (Glasgow), J. H. Whatford (Eastbourne).

The PRESIDENT then proceeded to deliver his Valedictory  
Address.

## PRESIDENT'S ADDRESS.

GENTLEMEN,

A voluntary office of honour may be coveted and longed for, and it may be accepted with alacrity and self-confidence or with much misgiving and apprehension on the part of the officer; still, in whatever mood it may be accepted, the acceptance is always a voluntary act. Not so its resignation. The period arrives when time gently taps the greatest and the best on the shoulder and bids him move on—and move on he must; for by that gentle tap the fastenings of the robes of office are loosened, the badge of power and distinction passes on to another, and the recently distinguished individual steps down from his exalted position and becomes even as other men are.

Gentlemen, without consulting my wishes in any way, time has tapped me on the shoulder to-night, and I resign to you the trust which you confided to me twelve months ago.

You have elected my successor, and I must congratulate you on having bestowed your suffrages on a gentleman who will prove an honour to his high office, and whose scientific ability and reputation are only second to the deep and practical interest he takes in the progress of his profession. Under the Presidency of Mr. C. Spence Bate, F.R.S., I think that we may anticipate a session of more than usual interest.

You have heard the reports of our office-bearers. Our Librarian has, I think, brought our fine collection of books into a state of order and accessibility such as should please the most irritable scientific book-worm. Not content with that, however, he has, in addition to other collateral matters, been able by determined energy and perseverance, and despite the ingenious perversity and carelessness of members,

to bring our members' list into as perfect and correct a form as the mutability of human affairs will permit. Our Curator, with his able assistants, has maintained for our museum the high character for order and classification which he has stamped upon it since his advent to office. The Council has responded liberally, and I think wisely, to the calls which have been made upon the funds of the Society for the improvement of our valuable and, speaking as a dentist, I may say unique collection. Hitherto we have only possessed the cast of the skull of a gorilla; now, however, we have a veritable skull, not only interesting in an anatomical sense, but presenting some pathological features in the teeth of special interest to us; besides this we have the hyoid bone and over a hundred other bones of the adult gorilla skeleton. These will all be mounted, and beside them will be placed their human homologues, forming a most instructive study in comparative anatomy.

Passing onward and upward by the natural law of evolution, I think I may again venture to congratulate the Society on the acquisition of the excellent portrait of our esteemed ex-President, John Tomes, F.R.S. Notwithstanding the heavy expenses which have had to be met this year, our Treasurer has been able to report a substantial balance in our favour. The Editor of the Transactions reports himself to you once a month during our session in a way which I hope satisfies you all. I venture in the name of the Society to thank these gentlemen for their self-imposed labours so cheerfully given, as also our three invaluable Secretaries. If ever the adage that "one volunteer is worth two pressed men" requires verification, the office-bearers of this Society may be taken as a good criterion. Last, but not least, would I thank Dr. Langmore for the unostentatious but effectual manner in which he applies his literary skill to the assistance of the Editor of our Transactions.

And now, gentlemen, our pæan is done. The loud timbrel



has been sounded, the tabour has been beaten, and now we must take up our harp amongst the willows, for Death has been busy in our ranks. We have to mourn the loss of Mr. A. Rogers, of Cambridge, Mr. W. I. Doherty, of Dublin, Mr. J. D. Grant, of Jersey, and on Saturday last it was my sad duty as your representative to follow to the grave the remains of one of our ex-Presidents, John Rigden Mummery. It seems but yesterday when he was an active member of our Society, and a constant attendant at our meetings. He was a frequent contributor to our Transactions, and his reputation as an Ethnologist had passed far beyond the limited circle of this Society. He was ever on the watch to bring his favourite study to bear on questions connected with his own speciality, and the volumes of our Transactions are enriched by the records of his observations on the teeth of different races, and the influence which their modes of life and the character and preparation of their foods may have had on the development of their jaws, and on the durability of their teeth. Those who knew him as an indefatigable worker may ere now have missed him as such, although hoping for his return, but those who also knew him as a genial, warm-hearted friend will miss him in two forms, neither of which will readily be replaced.

You may have observed that by removals, resignations, and deaths we have lost in all twelve members, while our new members only number seven. This is not an agreeable fact, but it cannot be passed over in silence on that account. The additions to our numbers have during the current year failed to supply the diminution from ordinary causes. True, our resignations have been rather above the average, but I do not think that this should satisfy us regarding the meagre show of new members. I do not wish to burden my few remarks with statistics, but it requires only the most cursory observation to know that a considerable number of dental students annually pass into practice from the London Dental

Hospital. Through the Odontological Society, a most valuable adjunct to study in the shape of a museum and library is brought within their daily reach. By the liberality of this Society they are made free of both stores of knowledge. I cannot conceive how men can enter practice and forget these things; still less can I conceive their remembering them and not hastening with all speed to give their hearty support to the Institution which has treated them so generously.

Turning to myself, gentlemen, my term of office has been peaceful and uneventful. Our meetings have been well attended. Our Transactions are full and well up to the standard of interest, and our discussions have, I rejoice to say, been brisk and instructive. The changes which have been introduced during the past year have been slight, and affecting matters of detail only. As President I have avoided attempting to introduce any innovations upon our established lines of procedure: 1st, because I think that recent changes require consolidation before we attempt fresh ones; 2nd, because I think that the want of change should be principally felt and expressed from without, and be made known by members to the Council; 3rd, because I think that members of the Council should propose changes, whether in detail or of a radical character. The most clear-headed President will find plenty to do if he conduct the affairs of the Society prudently and quietly; but if by force of character or persistency he impose changes on a too subservient Council, he may leave to his successor a legacy of trouble and care which he himself should have borne, but which the shortness of his term of office enables him to avoid. In conclusion, let me ask you all ever to think carefully over the affairs of the Society and how best to improve it. The Council—I say it with assurance—is only too anxious to do anything and everything for its prosperity. Try also to induce your professional friends to become members. It is a duty which they owe alike to themselves and to the profession.

## VOTES OF THANKS.

MR. CHARTERS WHITE said he had been asked to propose a resolution which he knew would be readily supported by all present. It was to propose a hearty vote of thanks to the retiring President for the time and trouble which he had given to the management of the affairs of the Society during his year of office. The members were well aware how ably and courteously he had presided over the meetings, and, as a member of the Council, he (Mr. White) would add that the President had shown equal ability in the Council room keeping every one strictly to the business in hand and checking all attempts at irrelevant conversation.

MR. CUNNINGHAM said he wished a Smiles would arise to write the biographies of some of the most prominent members of the dental profession. If such a series should be written Mr. Turner's life ought certainly to be included amongst them, and an appropriate motto for it would be the sentence which occurred in the President's Inaugural Address, that "it was a far cry from the workman's bench to the chair of the Odontological Society." He knew that Mr. Turner's example had been of great use to some of the younger members of the Society, and he wished it could be brought more widely under the notice of young men entering the profession. He had great pleasure in seconding the resolution.

The resolution having been carried with loud applause, the PRESIDENT said he could only thank the members briefly for the kind way in which they had received it. At the same time it would not be fair for him to take all the credit of the smooth working of the Society during the past year. Had it not been for the constant and valuable assistance which he had received from the Secretaries and the Council, all that he could have done would have been perfectly useless. He



should always look back with great pleasure to his year of office as President of the Odontological Society.

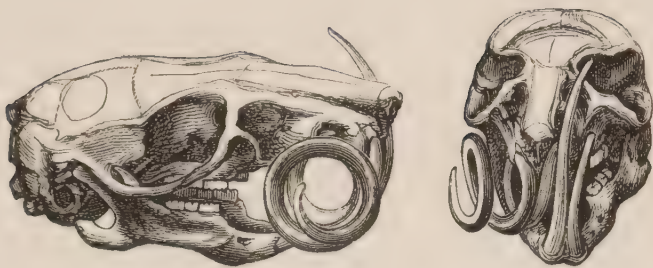
MR. OAKLEY COLES said he had been asked to propose that the thanks of the Society be given to the Treasurer, Librarian, Curator, the Editor of the Transactions, and the three Secretaries, for their services during the past year. At that late period of the evening, and considering the number and the multifarious duties of the officers included in this vote, he could not enter into details about them, but having held some of these offices himself, he could assure the members generally that the work attached to them was much harder than those who had no experience of it might suppose.

MR. TOD (Brighton) having seconded the resolution, MR. PARKINSON replied. He had returned thanks for this vote of thanks for so many years that he feared he was becoming rather a stale joke. He could confirm Mr. Coles's statement that to keep such a Society as this in good working order was not altogether play for those who had to do it, but the Executive would not mind a little trouble so long as they had the support of their fellow members.

The PRESIDENT then thanked the author of the paper and those who had brought forward Casual Communications for the trouble which they had taken. The next meeting of the Society would take place on Monday, February 2nd, when, amongst other things, they hoped to have the pleasure of listening to an interesting address from their distinguished President-elect, Mr. Spence Bate.

Mr. Storer Bennett's patient was then introduced, and the fillings executed by the Herbst method examined with great interest. Some time was also spent in the examination of the numerous other specimens exhibited by Mr. Bennett.

*Corrigendum.*—On page 36 of last Number, 4th line from top, for diastoma put diastema.



Skull of an old English Black Rat (*Mus rattus*), (caught at the Starch Works of Messrs. James & Son, Coxside, Plymouth, and kindly presented by them to Mr. F. H. Balkwill,) illustrating in a very remarkable manner the serious results which may happen to rodents from the continuous growth of their characteristic teeth when from any cause their normal antagonism is lost. Its two lower incisors have been deflected to the left, the two upper to the right, so that they do not meet in the usual way. The right upper tooth has described one complete circle and three-fourths of another, and being well inclined outwards it has not encountered any obstacle. The left upper tooth, after describing a circle, encountered the right upper jaw, which it has penetrated to the depth of one-third of an inch. The left lower tooth has been broken off, whilst the right lower tooth has penetrated the left upper jaw and the parts above, and its point projects a quarter of an inch above the highest point of the skull. It had also ulcerated through the lip in two places, a bridge of the upper lip covering a portion of the tooth. As the lower jaw was quite fixed, it could only be supposed that the animal had sustained life by sucking the flour. (See last vol. of *Transactions*, p. 256.)





# Odontological Society of Great Britain.

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## ORDINARY MONTHLY MEETING.

*Monday, February 2nd, 1885.*

C. SPENCE BATE, F.R.S., PRESIDENT, IN THE CHAIR.

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THE Minutes of the previous meeting having been read and confirmed,

MR. ARTHUR PALLANT signed the Obligation Book, and was formally admitted to membership by the President.

THE PRESIDENT announced that MR. HERBERT STEPHEN PARKINSON, L.D.S.Eng., of 36, Sackville Street, W., had been duly nominated, and would be balloted for at a subsequent meeting.

MR. GORDON HOOPER, L.D.S.Eng., of 112, Harley Street, Cavendish Square, W., was balloted for and elected a Resident Member.

MR. WEISS announced that a copy of "Cunningham's Proposed System of Dental Notation" had been presented to the Library.

MR. HUTCHINSON announced that some very good sections of the teeth of the *Elephas Meridionalis*, the fossil forerunner of *Elephas Primogenius* and the Mastodon, had been presented to the Museum by Mr. Charlesworth.

He had also great pleasure in announcing that the Gorilla's skull which had been exhibited at the last meeting by Mr. Storer Bennett had been purchased for the Museum by the Council. It would be remembered that the specimen was remarkable for the presence of a supernumerary tooth

on the inner surface of the ramus of the lower jaw, near the inferior dental foramen. The Society now possessed two skulls of the gorilla.

MR. STORER BENNETT said he had received from Dr. Herbst a set of specimens illustrating his method of filling teeth by means of rotating points. They had been intended for exhibition at the last meeting of the Society in connection with the paper on the subject which he (Mr. Bennett) then read, but unfortunately they did not arrive in time. Dr. Herbst kindly offered to present them to the Society's Museum, "if thought worthy of acceptance." Amongst them would be found various specimens of gold, of tin and gold, and of amalgam fillings, all inserted by Dr. Herbst's method.

He (Mr. Bennett) would take the opportunity of stating that since the last meeting he had been using some agate burnishers of a different make to those he had previously tried, and which did not break so easily. A good deal of time was saved by their use, since they did not get coated with gold, as was the case with the steel instruments, and therefore did not require the frequent cleaning.

MR. CHARLES TOMES said he had not as yet had much practical experience of the Herbst method, still he had worked at it experimentally, and he thought there were one or two points about it which were worthy of notice. There was no doubt that by its means fillings were readily made which would stand the ink test. It was, of course, easy enough to make such a filling with soft gold, but it was not at all easy with cohesive; in fact, comparatively few cohesive plugs would stand this test if the ink was a staining fluid and not composed of solid particles held in suspension. But by the Herbst method it was possible to make hard fillings which were proof against any ink—*i.e.*, it was possible to get the adaptability of soft gold combined with the advantages of cohesive. This was well seen if teeth were filled with soft and with cohesive gold by the usual method, and another by the Herbst method. If these teeth were then split, the surface of the soft gold-filling would be found to have a smooth

bright surface, almost as if it had been burnished. The surface of the malleted plug would be found not so fine and with no approach to burnish, whilst that of the Herbst plug would resemble that of the soft gold. He understood that Dr. Herbst was able to work by this method with great rapidity. He (Mr. Tomes) had not yet succeeded in doing it so quickly, still he could work in this way much more rapidly than with cohesive gold. Dr. Bodecker, in New York, used this method very largely, but he did not complete his fillings with it; he was in the habit of lining the cavity and filling it to about three-fourths with soft gold condensed by the Herbst method, and then building on to this cohesive gold condensed with smooth points. He could not help thinking that this discovery had a great future before it. Certainly by no other means could such perfect adaptation be obtained with so little trouble.

DR. FIELD said he understood that the matrix was to be wedged between the teeth so as to close a great portion of the mouth of the cavity. It seemed to him that this must often complicate things a good deal, and even render the use of a right-angle attachment necessary when it would not otherwise be needed.

MR. TOMES said this difficulty could be got over by bending the matrix, making it somewhat convex. It was possible to do without a matrix altogether, but it greatly increased the difficulty of the operation, since the gold was so much more liable to shift its position under the rotating point.

MR. WALTER COFFIN exhibited an operating stool, or body-rest, of novel construction, designed by his brother, Mr. Harold Coffin. It consisted of a plush-covered saddle, rotating and screwing up and down upon an upright stem attached to a firm base by a strong, conical, spiral spring, which gave it some vertical play and unlimited angular motion in all directions. Though an unstable equilibrium when sat upon, it formed a tripod with the legs of the operator, and so supported, without restraining the motion of the body.

MR. A. UNDERWOOD showed models of the mouth of a young



man seventeen years of age, a patient of Mr. Morris. In the upper jaw the incisors were altogether absent, the space being bounded on each side by two large canines, closely resembling dog's teeth; the rest of the teeth were temporary, and were badly formed. In the lower jaw he had only one tooth of the second set, the right canine, which, like the upper, was very strongly developed; the rest were all persistent temporary teeth. The patient's mother and father had perfectly natural teeth, and there was no history of any previous abnormality of this sort in the family, but his sister presented a precisely similar deformity. A case closely resembling this had been reported some years since by Mr. Moon in the Society's Transactions.

MR. MORRIS said he should be glad of any suggestions as to the best way of treating the case. The patient's father wished to have artificial teeth inserted; the boy could masticate fairly well, but the appearance was bad.

In reply to questions, he added that the patient's nails were defective, but he had plenty of hair.

MR. GEO. LUCAS (Gravesend) read notes of an interesting case of deficient dentition, which had been brought under his notice by Dr. Jones, of St. Bartholomew's Hospital, Chatham.

The patient was a well-formed young woman, twenty-two years of age, but who exhibited unmistakable signs of inherited syphilis, and who was admitted into hospital on December 11th, 1884, on account of a large ulcer on the left leg. For this she was successfully treated with twenty minim doses of Liq. Hydrarg. Perchlor. three times a day, without any salivation occurring. When first examined by Mr. Lucas, on January 28th of this year, the gums appeared almost edentulous, there being only two abnormally formed teeth; one, in the lower jaw, being not unlike a wisdom tooth, the other, in the upper, having the characteristic peg shape, and occupying the position of the cuspid.

On questioning her the following particulars were elicited:—

The tooth in the lower jaw was erupted when she was eight years old; from this it might be inferred that it was

an unusually small first permanent molar. The tooth in the upper jaw appeared six years later, *i.e.*, when the patient was fourteen. She stated positively that she had never had any teeth extracted, and, as far as she could remember, had never had any other teeth than these at all.

Several peculiarities in the appearance of the patient were noticed, which seemed to accord closely with the description given by others of cases of edentulous gums. A few instances were recorded,\* and probably others had come under the notice of members, in which a marked deficiency of teeth had been associated with almost complete alopecia. In this case, as in those referred to, the patient is almost hairless, and has been so, she says, since her birth.

Another striking peculiarity was the remarkable smallness of the jaws, which seemed to confirm the statement made by an eminent member of the Society, in his "Manual of Dental Anatomy," that the growth of the jaw depends upon the presence of the teeth.

Besides these characteristics Mr. Lucas noticed others which were not mentioned in the published cases. The patient's face had a remarkably flattened appearance, the nasal bones being apparently wanting. Her skin also was extremely thin and tense, especially upon the lower and upper extremities.

MR. DAVIS exhibited models of the mouth of a young man, aged twenty-six, showing a remarkably wide open bite; only three pairs of teeth met when the mouth was closed. The patient stated that his teeth never had met in front, but that things had been getting gradually worse. He wished to have his front teeth extracted and replaced by artificial ones, but Mr. Davis did not like to do this.

The PRESIDENT asked whether the patient had ever had his teeth regulated, to which Mr. Davis replied in the negative.

\* Trans. of the Medico-Chirurg. Soc., vol. xxxi, p. 71; Daaz, in Stark's "Archiv. f. d. Geburtskölfe," vol. iv, p. 684; Lehrbuch der Path. Anatomie, von Dr. A. W. Otto; "Animals and Plants under Domestication," Darwin. p. 321, &c.

MR. ARTHUR UNDERWOOD said some of those present might remember that, at the November meeting, he had asked the advice of the members with reference to a case in which a minute exposure of the pulp of two molar teeth gave rise to the most extreme sensitiveness. Amongst other suggestions made at that time, the President advised that the sensitive points should be touched with strong nitric acid. This was tried, but it caused very great pain, which lasted for a considerable time, and the after results of this treatment were not satisfactory. Mr. Underwood then applied the rubber dam and used arsenic, leaving it in contact with the part for a couple of hours. This was followed by complete relief from pain, and there had been no recurrence since.

MR. HUTCHINSON said it would be remembered that at the December meeting of the Society he had brought forward a communication from Mr. Oakley Coles on the use of Cocaine in Dental Surgery, and had also himself made some remarks on the subject. Since then he had made some experiments with the object of ascertaining whether the drug was of any use for relieving the pain of extractions. He applied a pad of amadou on each side of the tooth to be extracted, dried the gum carefully, and then applied crystals of hydrochlorate of cocaine all round the tooth. The result, in about two minutes, was almost complete anæsthesia. The patient said she could feel the digging of the instrument, but felt no pain. In another case he wished to extract the buried roots of a second molar and also a bicuspid tooth. Thinking to make a good comparative experiment, he applied the crystals of cocaine to the molar roots, but not to the other. Both were, however, extracted with but little pain. He had previously found a 20 per cent. solution quite useless for preventing the pain of extractions, but with the crystals he had had considerable success. He should watch carefully to see whether any tendency to sloughing or inflammation followed their use, but he had not seen anything of the kind at present.

MR. MORTON SMALE said that in a case where very great pain persisted for some time after extraction, he had tried



the effect of applying a 24 per cent. solution of the hydrochlorate. It appeared to give a little, but very little relief; no inflammatory signs followed.

MR. A. UNDERWOOD said he had applied a 20 per cent. solution to an exposed pulp, and found, after an interval of five minutes, that it had produced scarcely as much effect as carbolic acid.

The PRESIDENT said Mr. Brunton, of Leeds, had been good enough to send him some citrate of cocaine prepared by himself, and he (Mr. Bate) found that it had a very marked effect on sensitive dentine.

MR. HUTCHINSON said Mr. Brunton had also sent him some of the citrate of cocaine, and he (Mr. Hutchinson) could confirm what the President had said with reference to its effect on sensitive dentine. He thought that in using solutions of cocaine in the mouth, the effect of the natural moisture of the cavity in diluting the strength must be taken into account. He thought that the crystals used in the mouth in the way he had described might be taken as equivalent to the application of a 50 per cent. solution. It was important in using cocaine to relieve the sensibility of dentine that the cavity should be dried before applying it, and again dried before excavating.

The PRESIDENT then proceeded to deliver his Inaugural Address, as follows:—

## PRESIDENT'S ADDRESS.

GENTLEMEN,

In attempting to address you on this occasion, I must appeal to you in two separate portions: those who have received the honours of the Presidential Chair, and those who have yet to obtain that distinction—the highest mark of professional recognition that any of us can hope to attain.

The former I would ask to remember what their feelings were when this position in the Society was conferred upon them, and by their own high appreciation of the honour, to believe in mine.

The latter I would beg to pause and think what their feelings will be when the time comes for them to be elected.

And both I will ask to multiply the sense of the honour 250 times, being the amount in miles to which you have called me to fulfil the duties of President of the Odontological Society of Great Britain.

To this I will add, what I am sure you will generously accord, some forbearance for any shortcomings on my part, and you may obtain an approximate idea of my sense of your kindness for the honour you have done to me.

When in 1856 the late Mr. Arnold Rogers read a paper "On the Reduction of Limaille," he commenced the literary history of this Society, the career of which has quietly and peacefully revolutionised the practice and position of the dental practitioner.

Before this Society was formed the members of our calling were not only scattered, but they existed in a common dread of each other. If a man had an idea in his mind that he thought was advantageous, he felt it to be his duty to keep it to himself, fearing that his neighbour might rob him of a

privilege. Weak in himself, he was jealous of those around him, not being able to realise that individual progress is always slow.

It was on the 6th of November, in 1856, that a few earnest individuals from the North, South, East, and West of England—and they were very few—met to commence this Society, which has done such great things in the scientific progress of our profession, by gathering knowledge from all parts of the world and presenting it open-handed to those who were desirous of learning.

When this Society commenced, there was scarcely any knowledge of work beyond that which could be produced from gold, silver, and bone; mineral teeth had been scarcely a decade in existence, and these were not of that strength and adaptability as to exclude the human tooth from being largely utilised.

Mechanical work was the great aim of the dentist, and to save a tooth that had pained was seldom attempted unless the dread of extraction overcame professional experience.

When this Society was once formed, communications came in quickly, and men were willing to give their experience when they found others desirous of doing the same. Thus communications were forthcoming on all subjects connected with the teeth, and these it will not be inconvenient to divide into the following, viz.: Mechanical, Anatomical (human and comparative), Physiological, and Surgical Dentistry.

As the mechanical work was thought to be of the greatest importance, it naturally followed that a paper regarding it should be among the first read, and another soon followed in which Mr. Duffe informed us that the introduction of palladium, dental alloy, and other white metals as substitutes for gold and silver, was unjustifiable, even where economy was a consideration; that the ivory of animals was variously used, and that of the hippopotamus more nearly resembles in character human dentine than any other substance employed.



by dentists. Mineral teeth, as introduced by the English and American manufacturers, he compared with those of the French make, but reported that the best forms were far from perfect, being wanting in strength.

Soon followed a paper by Mr. Statham on Plate-casting. Instead of striking plates out of sheet gold, he recommended a mould being made with loam and plaster of Paris, or a composition of blacklead, into which he poured the metal, and in this manner obtained a plate of the form of the mouth, with bands or clasps in one piece; to this he soldered the pins to carry the teeth.

This communication was followed a little time after by one from Mr. Thomson on his mode of "Striking up Plates," which was by using a machine somewhat like a guillotine, or pile-driver, the pedestal or base of which is 2 feet high, of cast iron, and weighed nearly 4 cwt.; from a cross-beam between two wrought-iron pillars a hammer of  $31\frac{1}{2}$  lbs. descended upon the metal die, and so drove it home with the most satisfactory results.

About two years after, Mr. Fox, of Gloucester, gave us his experience of an Hydraulic press for swaging gold plates. For this purpose he had a small press of at least 10 tons pressure made, and his experience justified his anticipations, it being a valuable addition to the capabilities of his workshop, taking but little room. It is simple in its work, and takes but little time,—in some cases no more than the old method,—and where it does occupy more time it is quite worth it, for the ease with which it produces a good plate. In plates for single teeth, Mr. Fox found the press of very little advantage, and in some cases preferred the hammer to the press. Thereby, I think, demonstrating that after all it is the brains behind the tool that has to do the work.

Just at this time metallurgical research introduced to our notice the power of obtaining *aluminum* in considerable quantities, and Mr. F. G. Harrington brought to the notice of

this Society a mode of casting beds and palates for artificial teeth in this metal. The arguments in favour of this new metal over gold were that it possessed the property of resisting the action of all such acids as were likely to come in contact with it in the mouth; its lightness, colour, appearance, and durability. He thought that a set made with this metal would be double the value of one made with gold. The metal was said to be more easy and pleasant to work than gold, and its expense was below that of bone.

Some few months after the previous communication, Dr. Blandy, of New York, introduced to this Society his *Cheoplastic* method of mounting artificial teeth. Instead of aluminum he used a quickly melting compound, which was either type metal or something very like it. This he cast in moulds similar to Mr. Harrington's; but the great advantage that he claimed was, that his method enabled the manipulator to introduce the principle of atmospheric pressure for the purpose of retaining artificial palates in the mouth.

This method was almost immediately followed by a communication by Mr. Putman, of New York, "On the Vulcanite Base as applied to Dentistry." It is now just six-and-twenty years since this communication was read, and this was shortly followed by one by Mr. Childs "On Super-heated Steam," and another by Mr. Patrick "On Vulcanising by Dry Heat."

Small improvements in the apparatus used were continually being made, and about a year after Mr. Putman had read his paper, Mr. Dewar introduced to the Society a self-packing vulcanite apparatus somewhat similar to that which Mr. Gartrell has more recently perfected.

Gutta-percha had for several years been used in the hands of a few persons as a base, but it scarcely received the notice of the profession until Mr. Truman brought it before this Society in a communication "On the Necessity of Plasticity in Mechanical Dentistry."

These communications were the result of the first five years of the Society's existence. The second five years passed without any paper having been read that belongs to mechanical dentistry, but at the end of that time Mr. Balkwill gave us one "On the Best Form and Arrangement of Artificial Teeth for Mastication," and Mr. R. Hepburn another "On Hard Rubber," in which he states that since the reading of Mr. Putman's paper in 1861 we have been rapidly progressing in the knowledge and use of vulcanite, and we now understand its real value, and feel better able to judge in what cases it is best adapted. Year after year gives us some new, if not improved, flask or vulcaniser, and various combinations of rubber are being continually introduced, each one said to have some good and peculiar quality which its predecessor did not possess, but all revealing the large use of vulcanite, and the interest taken in it.

This communication, which was presented to the Society in 1866, reads as if it were the experience of the present day, showing how little progress in dental mechanics has been added to our knowledge since that time, particularly in relation to "one of the greatest objections frequently urged against the use of vulcanite; I allude to the injurious effects it is said to produce upon the mucous membrane of the mouth of some patients, and even to affect their constitutions generally. It has been alleged that small ulcers, sores, and other symptoms of salivation, both local and general, have been exhibited after the use of rubber cases, resulting, it is said, from the bisulphide of mercury, or vermilion, used as a colouring agent in the manufacture. In confirmation of this it has been stated by some that the globules of mercury may be seen by the naked eye oozing from some of the rubbers supplied for our use. So far, I have not been able to detect free mercury in any of the numerous rubbers which have come under my observation. I have treated and subjected these rubbers to extreme pressure, with gold and copper foil



between the layers, without being able to express any signs of mercury, or the slightest stain of it on the foil. . . . We know that bisulphide of mercury is an insoluble powder, incapable of being affected by nitric or muriatic acid, and I find no evidence to show that it can be acted upon by the secretions of the mouth, more especially when retained in combination with the hardened rubber compound."

With the discovery of vulcanite as a base for artificial teeth, it would appear that dentists imagined that research had culminated in a climax; for with the exception of the beautiful and ephemeral *celluloid*, which has been brought before the Society by Mr. Oakley Coles at one time, and later still by Mr. Hunt, of Yeovil, no fresh stride has been made in this direction.

With improvements in materials and power of working, ambition appears to be satisfied, and perhaps when Mr. Verrier has enabled us successfully to add a continuous porcelain gumwork to the vulcanite base, we shall have approached within a measurable distance of a means of attaining as perfect an artificial denture as may be practicable.

In the subject relating to the anatomy of the mouth, both comparative and human, we are not so rich as I think we might be, but those communications that we have bear the impress of research. It was early in the history of the Society that Mr. Cattlin read a paper "On the Form and Size of the Adult Antrum," from which we learn how varied is the form of that cavity, and how important it is that the operative dentist should be familiar with its relations to the neighbouring structures which he has to treat.

A year after, Mr. Mummery, who has been so recently taken from us, and whose loss we have so much to deplore, described, in three papers copiously illustrated, the Structure and Adaptation of the Teeth in the Lower Animals, and their relation to human dentition.

Dentition being co-extensive with vertebrate life, and in a different character in many invertebrate forms, it is highly desirable that we, who take but one organ as a special study, should encourage a culture that embraces the entire study of the subject ; for, in the words of the renowned Abernethy, "the man who confines his attention to a single object will have a mind as contracted as the object he contemplates. Knowledge of various kinds is requisite to form the true surgeon : it serves like light shining from various sources to illuminate the object of his researches." And after having directed attention to the more characteristic forms of dentition in the lower animals, the author says that apart from the rich store of intellectual gratification to be derived from the study of the infinite variety of special adaptation of structure to function, throughout the world of animal life, it serves an important end in training the observant faculties, which cannot fail to be serviceable in a profession such as ours.

Nearly six years elapsed before any purely anatomical paper, either comparative or human, again appeared, when Mr. Ibbetson read one "On the Teeth of the Fossil Fish in the Palæozoic and Mesozoic Rocks." This communication was chiefly illustrative of external form, and the quantity of the several families of fish in relation to the geological record.

This was followed, about a year later, by a paper "On the Dentition of the Mole," illustrating the development of the deciduous teeth and their relation to the permanent set, more particularly with a view to demonstrate the homology of the great double-rooted canine tooth.

This was almost immediately succeeded by a paper by Professor Owen "On the Dental Characters of Genera and Species, chiefly of fishes, from the lower main seam and shales of coal, Northumberland." In this communication the distinguished Professor said that he had selected his paper "from a supplementary chapter for a second edition of his 'Odontography,' some materials not heretofore made public ;" and, he

added, "I feel pleasure in this opportunity of co-operating with the practical members of the Society in their purely scientific aims to establish their most useful branch of surgery on the broad basis of Hunterian physiological principles, as deduced from a survey of the modifications of dental structures and phenomena throughout the animal kingdom."

This was immediately followed by a paper by Mr. Balkwill "On the Relation between the Forms of Teeth and the Conditions of Life in Mammalia," in which the author stated that he treated the subject rather as one of mechanics than of natural history. This communication was succeeded by two papers by Dr. Murie "On some Abnormal and Diseased Dental Conditions of Animals," in which he demonstrated the relation that exists between the dentition of the inferior creatures and man—whether healthy or diseased; and he further states that "those rare cases, the red-letter ones in every dentist's experience, are where broad views come to bear, and where, as I conceive, or can not only look for, but find, in the lower animals, a clue to unravel the tangled web often wound round obscure dental changes in man."

The etiology of dental disease requires the microscope to master it, and in the paper by Mr. Charters White, "On the Minute Anatomy of the Pulps of the Teeth," its necessity is demonstrated in the researches which induced him to determine the fibrils of the nerves of the pulp in their relation to the sensitive dentine. This was followed by some notes "On the First or Milk Dentition of the Mammalia," by Professor Flower, F.R.S., who, in concluding, said: "I think that I have shown enough to prove the importance and interest of a closer study of the characters and period of the development of the milk teeth, and by showing the deficiencies of our present knowledge, to stimulate members of this Society who may have leisure and opportunity, to contribute whatever is in their power towards a fuller elucidation of the subject."



Immediately succeeding, we have a communication by the late Professor Rolleston, F.R.S., "On the Development of the Enamel in the Teeth of Mammals," as illustrated by the various stages of growth demonstrable in the evolution of the fourth molar of a young elephant (*Elephas Indicus*), and of the incisor teeth in the foetal calf, in which the author stated his belief, that previously it had not been recorded that the enamel of the elephant's molar, as also that of the mastodon, presented the same decussating arrangement of the inner portion of its enamel which Mr. Tomes has figured as being found in some of the Rodentia, thus giving a fresh illustration to the rodent affinities of the elephant, which have been so often commented upon.

After receiving a description of an *Odontome* from Mr. Charles Tomes, as exhibited in a specimen that sprang from a small pedicle in the median groove which traverses the right lower molar of a horse, in which there was neither dentine nor enamel visible, but only a convoluted mass of cementum, we get a paper by Mr. Henry Moon "On Irregular and Defective Tooth Development," in which he says that the dental irregularities of excess and defect might have light thrown on them by being considered together with the normal architecture of the teeth.

The fact that the crowns of the human teeth are formed around a single dentinal system seems to have prevented the full recognition of the fact that the variety of form in the several classes of teeth is due to a multiplication and modification of a simple and elementary tooth form. These elementary forms appear to re-assert their autonomy under disturbed conditions of development. One of these denticles is shown to us in the most common and simple of supernumeraries, consisting of a conical crown and tap root. When we remember that the typical form of these supernumerary teeth closely resembles, both in structure and form, those of the cetacean type, where the earliest compound tooth is

shown in the foetal whale in Professor Owen's "Odontography," where two germs are seen to unite in one sac, I think that the study of these rudimentary representations of lost organs would form an interesting and important chapter in the history of evolution, that would fully compensate for a close and persistent investigation.

In a communication "On some Forms of Dentine Calcification and their bearing on Dental Pathology," Mr. Charles Tomes has shown how valuable and instructive is the study of the dentinal tissues of animals in relation to diseases and changes in the human teeth, when read by the light of an observant mind. He compared the Mammalian dentine with the vaso-dentine, the plici-dentine, and osteo-dentine, as seen in fish, and the globular dentine as seen in the pulp of various animals, and which differs more in size than kind from calcospherites, which can be artificially produced.

It would seem, then, that we may place these several forms of calcification of dentine pulps in a scale, passing from hard dentine as the highest, through vaso-dentine and osteo-dentine to globular dentine as the lowest and least specialised. Thus the tissues produced as morbid structure are normal tissues in certain other teeth.

In May of the same year Mr. Hilditch Harding furnished a paper "On the Absorption of Bone and Tooth Structure," and twelve months afterwards Mr. Arthur Underwood furnished one "On the Functions of the Nerves of Taste," in which he arrived at the conclusion that the glosso-pharyngeal nerve presided over the whole sense of taste, both at the root and over the tip and sides of the tongue, and that it is the only nerve of taste, and that the second and third divisions of the fifth pair have as little to do with this sense as the first division has to do with the sense of sight.

With the exception of notes by Professor Flower, F.R.S., "On the Specimens of Abnormal Dentition in the Collection in the Museum of the Royal College of Surgeons," and which

was communicated to promote the scientific consideration of the subject connected with the profession, no paper on the anatomy or physiology pertaining to the organs of the mouth appears to have been communicated to the Society until 1883, a period of four years, when Mr. Bland Sutton, the senior Demonstrator of Anatomy at Middlesex Hospital, read one "On the Development of the Inferior Maxilla." In this communication the author contends that the several bones which go to build up the compound jaw of fish are represented in the simple bone of the Mammalia, and concludes that actual observation, reinforced by the application of theory, and rendered more than probable by the appeal to comparative anatomy, support the view of the compound nature of man's inferior maxilla.

A year later we find the same author giving the Society the benefit of his observations in "Comparative Dental Pathology." He not only demonstrated the existence of odontomes, alveolar abscess, and constitutional disease in animals, but produced also the evidence of some inflammatory and ulcerative process in the original formative pulp of the tooth of a fossil horse. His communication also demonstrated the causes that induced defective palates, as shown by Professor Paul Albrecht, and his own reason for not accepting the duplicity of the centres of each incisive bone, and argues that "too great a protest cannot be raised against a practice now getting prevalent—of drawing conclusions as to morphology from pathological specimens."

While referring with pride to the tone and character of the papers on Dental Anatomy and Pathology that have been brought before this Society, we cannot help noticing that the greatest advancement of knowledge has been made directly in the line for which the Society was formed, that is, in the progress of dental surgery. And it is a curious and remarkable fact that, with the exception of a paper by Mr. T. A. Rogers "On Capping the Exposed Nerve," no communication on the



treatment of the pulp with a view to the preservation of the tooth was brought before the Society until July, 1860, or nearly four years after it was formed.

Undoubtedly we had papers of interest to the dental surgeon in many forms:—"An Account of an Inverted Tooth and its consequences," by Mr. Tomes; "The Reunion of Teeth with the Alveolus," by Mr. Woodhouse; "On Lateral Pressure," by Mr. Bridgman; "On Appliances for Reducing Irregularities of the Teeth," by Mr. Ritchie; "On Inflammation as it appears in the Mouth, and its Treatment," by Mr. E. Sercombe; and others of more or less importance, but all of value, as they conduced to build up the profession we follow, as the lumps of forgotten food the child devours go to form the man.

I said that it was nearly four years after the inauguration of this Society before the first communication on the treatment of the pulp after it had become inflamed, in order to preserve the tooth, was read. Nor is this a thing to be wondered at. Did I not say on commencement that we then knew but little, and that little we were afraid to communicate? Remember the state of dental surgery then.

The old key was struggling hard to retain its existence as a surgical instrument. It was only in 1846 that Mr. Tomes communicated to the *Medical Gazette* the character of the forceps that have since been in use. The discussion between microscopists as to whether the dentine was penetrated by a system of tubuli or supported by fibres was rather suspended by the early death of Mr. Nasmyth than set at rest by accurate demonstration, and could not be said to have been determined until Mr. Tomes published his communication in the *Philosophical Transactions of the Royal Society* in 1866. With this knowledge a new generation commences whose professional education gives them power to observe and courage to think.

In 1860 Mr. Belisario sent us from the Antipodes his experience in performing the operations of Rhizodontrophy on teeth after the pulp had become inflamed and suppuration

had been set up, with the valuable and important result that an examination made some months after by the cautious introduction of a drill into the cavity, "which came into contact with solid substance, without producing the slightest uneasiness on pressure," clearly indicated that the pulp had calcified.

This communication was shortly followed by one from Mr. Coleman "On the Method of Treating the Dental Pulp with a view to Produce Calcification."

His plan of treatment was the application of a strong solution of tannin in ether, and over this cotton and mastic. The result was, that in fourteen days from the commencement he cut away the tooth in the direction of the pulp cavity. "After removing a substance of the consistency of leather, and more resembling it than anything else, the outline of the pulp cavity was exposed, which was filled with a mass of fawn-coloured dentine, of a consistency somewhat harder than horn." He further adds, that the plan of treatment adopted is the one he almost universally pursues, as he believes that a tooth suddenly cut off from the supply of blood which enters it through its fang is also liable to become necrosed; he therefore deems it of great importance to preserve as much of the dental pulp as possible.

This was followed at the next meeting by a paper by Mr. Samuel Cartwright, giving his experience "On Disease and Treatment of the Pulp. For the reduction of inflammation he advocated a solution of tannin, and for the relief of pain where suppuration had intervened, he told us of the value of the process of Rhizodontrophy. "I have," he said, "within the last three or four months, treated numerous teeth in this manner, and in every instance relief within a short time has been afforded." But he further adds, "So many cases occur in practice, where from circumstances it is not possible to undertake a course of treatment which will secure a probably successful filling." "Under such

circumstances the operation enables us to fill a tooth, with reasonable conviction that after-inflammatory action will not take place." And adds in a note, with the candour of a true man of science, "that he had afterwards an opportunity of seeing some of the cases that may be pronounced successful, though it cannot be said that the teeth were always comfortable."

We shortly find that Dr. Belisario advocates in the treatment of diseases of the pulp, particularly in those cases where suppuration had not supervened, and a certain amount of disorganised dentine existed, the use of Tr. Ferri Mur., sealing it in, and occasionally renewing it, and when the tenderness had subsided filling the tooth with gutta-percha and tannin, and under ordinary circumstances, in from six weeks to three months, the disorganised tissue has become hardened, from a deposition of the salts of lime.

Shortly after, Mr. Thos. A. Rogers gave, under the title of "Fang-filling," his experience on the destruction and removal of the pulp, and advocated that the organ to be treated should be as largely exposed as possible, that the formula employed should be,—arsenious acid three parts, acetate of morphia two, and creosote sufficient to form a thick creamy paste; a small portion of this paste should be taken on the point of an instrument and gently placed upon the exposed pulp so as to cover every part of it, and over it a gold cap should be placed, and secured by a temporary plug of wool and mastic, or wax, or osteo-cement. This he retained in position from forty-eight to ninety-six hours, according to the condition of person or tooth; it then may be removed, and if the patient could not bear the operation immediately, he applied creosote daily from a week to a fortnight before removing the pulp, after which he treated the cavity daily until it was in a condition to receive a filling of gold foil. He illustrated his practice by describing seventeen cases, all of which were more or less successful excepting one.



Soon after this Mr. Woodhouse introduced to the Society the value of carbolic acid in its purer state, and a paper was read on the treatment of the pulp, with a view to its preservation by the means of this antiseptic, by Mr. James Bate, and another by Mr. Ashley Barrett, who thinks that "a great step has been made in dental pathology, now that we are able to assert with confidence that, wherever any signs of inflammation outside the tooth are present, they are caused by putrefaction going on within; that a tooth is never tender on pressure or tapping without containing a putrefied pulp, and that a gumboil is evidence of chronic periodontitis, which latter is caused by an escape from the tooth of particles of decomposed nerve," his object being, he said, to advocate the utility of carbolic acid, in firstly preventing putrefaction of the dental pulp, after its being devitalised by arsenic, and secondly in arresting putrefaction of the dental pulp when once established, and so directly curing periodontitis. These assertions of the author were canvassed in discussion, and afterwards considerably modified by him.

At the succeeding meeting Dr. Walker followed the subject with a communication "On Treatment and Extraction of the Tooth Pulp." His treatment was to dress the pulp with thoroughly levigated arsenic, creosote, and morphia, on cotton wool, and retaining it for twenty-four hours by a temporary stopping, when it should be removed and replaced by a plug of wool, the base of which should be saturated with a solution of mastic, and the apex tipped with fifteen granules of tannic acid and one-tenth of a grain of acetate of morphia. When suppuration has set in, the cavity should be well sponged with solution of carbolic acid, and in forty-eight hours a barbed instrument may be inserted for the extirpation of the pulp, after which he forces creosote by means of a fine steel rod enveloped in wool, using it as the piston of a syringe, repeating the operation until the fluid passes through the sinus of the alveolar process at the apex of the fang, finally

clearing the canal with wool and pure spirits; and in the course of discussion Dr. Walker attributed the power of extracting the pulp whole to the influence of the second dressing of tannic acid.

This was followed by a communication from Mr. G. D. Pollock, President of the Pathological Society of London, "On Alveolar Abscess dependent on Diseased Teeth," in which he gave a series of cases in which the eye, nose, antrum, or neck had become involved with a carious tooth; and he came to the conclusion that in all instances of abscess or ulcer in the upper or lower maxillary regions, in certain cases of discharge from the nostrils, or in pains about the orbits with defective teeth in the jaws, it is always best at once to have recourse to their removal; acting on the principle that it is best to clear away any doubtful point in the treatment of a case before recourse is had to any other measures. This opinion being generally protested against by the members present, Mr. Pollock said that he looked at teeth merely as a surgeon, and did not think them of so much value as many of them apparently did, and that perhaps he should modify his practice a little, and have the teeth sometimes treated, instead of having them extracted.

In a communication "On Nervous Diseases connected with the Teeth," Dr. Lauder Brunton, F.R.S., after describing many instructive and interesting cases in which various forms of disease were cured by the direct treatment of the teeth, remarks that "affections of the intestinal track depending on dental irritation are of very considerable importance indeed." "The close connection between the roots of the fifth nerve, and those of the vagus, can be demonstrated anatomically, and it is probably in consequence of this that irritation of the fifth is able to exert such a powerful influence upon the circulation;" and further continues, "We have now seen how affections of sensation, of motion, and of nutrition may all be dependent upon dental irritation, but even the

cerebral faculties themselves may also suffer from a similar cause," of which he gave several striking instances in corroboration of his assertion. And still more recently there is a paper by Mr. Power, Ophthalmic Surgeon at St. Bartholomew's Hospital, "On the Relations between Dental Lesions and Diseases of the Eye." In the course of this communication he says, "The influence of dental lesions on the accommodation has been particularly investigated by Dr. Herman Schmidt, of Berlin. This observer examined the eyes of ninety-two patients, who presented themselves at his clinic, suffering from some sort of dental disease—such, for example, as caries, periostitis, or neuralgia. Amongst the ninety-two cases Schmidt found there were only nineteen in which the range of accommodation was normal; in the remaining seventy-three cases the range was lowered, and in most instances considerably reduced."

"In regard to the locality of the dental lesion; in forty-one cases in which the upper maxilla was affected, paresis of accommodation was observed seventeen times. In thirty-nine cases in which the lower jaw was affected, the paresis was observed nineteen times. Disease of the teeth of the lower jaw, therefore, appeared to be somewhat more effective in producing failure of accommodation than that of the upper jaw." And he concludes, "I think it may be laid down as a maxim to be generally observed, that in all cases of threatening glaucoma, especially when this is associated with ciliary neurosis and obscure pains in the temples and maxillary orbital regions—in all cases of mydriasis, and probably of myosis, originating without apparent causes—in all cases of sudden paralysis of either of the orbital muscles, or of loss of sensation in the absence of cerebral symptoms—in all cases of phlyctenular disease of the conjunctiva—in all ulcers of the cornea resisting ordinary treatment—in all cases of sudden failure of accommodation, especially in young children—and finally, in cases of exophthalmia, the condition of the



teeth should at least be examined, and if faulty conditions present themselves, these should be rectified, and then one at least of the possible causes of each of these diseases will be removed."

Time will not admit of our even mentioning one-half the work that has been done, or discussing such important subjects as the replantation and transplantation of teeth, which has been introduced to our notice by Mr. Woodhouse, Dr. Magitot, and Mr. Coleman, or more than to draw attention to such valuable contributions as those of Mr. Oakley Coles, "On the Production of Articulate Sound," and of Dr. Langdon Down, late Resident Physician of Earlswood Asylum, "On the Relation of the Teeth and Mouth to Mental Diseases."

To review the progress that has been made in the recent manner of introducing gold and other fillings, together with the use of the rubber dam, which has completely revolutionised our practice and operations, would require a chapter in itself even to record the work that has been done.

Our knowledge of dental caries has, through the researches of Messrs. Milles and Underwood, undergone an investigation that we sincerely trust will shortly lead to a conclusive demonstration of its true character.

Within the period of the Society's history anæsthetics have undergone considerable investigation, and if not for nothing else the value of this addition to surgical operations ought to make the name of dentist popular, the full advantage of which we may not be entitled to until we have discovered the means of obtunding pain in acutely sensitive dentine, which I trust the citrate of cocaine is about to bring us, a circumstance that will render our operations both more certain and less disagreeable.

In glancing through the several volumes of reports, I think that the Society has cause to congratulate itself upon the position that it has taken among the professional and scientific bodies.

That persons have come from the Continent of America and the Antipodes being students in our speciality is a favour that was not beyond the reach of our hopes, but when we find that men of world-wide renown, such as Professors Owen, Rolleston, Flower, and Murie, have sent us their researches on subjects relating to our studies, and that men like Power, Down, Brunton, Pollock, Hutchinson, and Richardson have made this Society the medium of their professional experience, we feel that the Society has a duty to fulfil and a reputation to preserve, which, with your co-operation and assistance, I sincerely hope will be both upheld and advanced during the time I have the honour of presiding over it.

## VOTE OF THANKS.

MR. CHAS. VASEY said he had very great pleasure in proposing a vote of thanks to the President for his very interesting address. There was only one point in it with regard to which he felt at all disposed to differ from Mr. Spence Bate; he doubted whether the President had not drawn rather too gloomy a picture of the state of the profession when the Society was founded. He (Mr. Vasey) was inclined to think that the evils of that day were due, not so much to a love of secresy on the part of individual practitioners, as to the absence of all means of publicity. However, as the President had shown, there had been since then a great advance in the science of the profession, and this had been owing, in no small degree, to the influence of the Society. And not only had both scientific and social progress taken place, but the constitution of the Society itself had been improved; it was to this that they owed the satisfaction of having Mr. Spence Bate as President, and they were very pleased that he had not found the long distance an obstacle to his acceptance of the office.

MR. THOS. UNDERWOOD said he had great pleasure in seconding the proposal that a vote of thanks be given to the President for his address. He had listened with great interest to the exhaustive account which he had given of the history of the Society. The progress which had taken place in the operative department of dental surgery since the foundation of the Society was certainly very marked, and to this the Society had largely contributed. When it was started, English dentists were undoubtedly under great disadvantages in comparison with their fellow practitioners in America, and they had, unfortunately, no opportunities of



improving themselves. Now he could confidently affirm that English dentistry could challenge the world.

The resolution having been carried with much applause, the PRESIDENT briefly expressed his acknowledgments. He hoped to be able to perform the duties of his office satisfactorily; at all events he would endeavour to do so to the best of his ability.

The Society then adjourned until March 2nd.





*H. R. Barraud, Photo.*

*Woodburytype-*

JAMES PARKINSON, L.D.S. ENG.







# Odontological Society of Great Britain.

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## ORDINARY MONTHLY MEETING.

*Monday, March 2nd, 1885.*

C. SPENCE BATE, F.R.S., PRESIDENT, IN THE CHAIR.

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THE Minutes of the previous meeting having been read and confirmed,

THE PRESIDENT announced that Mr. Edward Latchmore, L.D.S.Eng., of 31, Upper Baker Street, Regent's Park, had been duly nominated, and would be balloted for at a subsequent meeting.

MR. WEISS (Librarian) said he had to acknowledge the receipt of a large collection of dental periodicals from Mr. S. L. Finzi; some of these were early numbers, and therefore valuable.

He had also received the following:—Dental Surgery for General Practitioners, by Ashley W. Barrett; Quarterly Journal of Microscopical Science, January 1885; Journal of Anatomy and Physiology, January 1885; Calendar of the Pharmaceutical Society, 1885; and the Transactions of the International Medical Congress of 1881. For the last he was indebted to Mr. Jas. Parkinson.

MR. OAKLEY COLES showed a pair of excising forceps for upper back teeth. They were so curved as to enable the operator to get at the back of the second molar and cut down a wisdom tooth stump to the level of the gum. Mr. Coles added that though these forceps had been made expressly for him, according to his own pattern, he should not be surprised to hear, as was so often the case under such



circumstances, that some one else had been using a precisely similar instrument for years past.

MR. HUTCHINSON announced that Mr. Charters White had presented to the Museum copies of the beautiful photographs of the salivary glands of insects which he had exhibited last year in illustration of his paper.

He had also received from Mr. White, of Norwich, the skull of a shark, caught near Felixstowe; the skull of a ray; and a cat's skull showing a fracture of the lower jaw, which had united with very slight deformity,—a good example of what nature could do without the aid of splints.

MR. WHITE said he had brought two other specimens which he proposed to offer to the Museum. One was a model of the upper jaw of a young man, aged eighteen, showing two permanent laterals placed directly one behind the other. The pressure of the antagonising tooth had caused absorption of the posterior of these teeth to such an extent as to lay open the pulp cavity. Mr. White extracted it, and showed it with the model.

He also exhibited models of the mouth of a young lady, now aged nineteen, whose case he had brought before the Society in December, 1883. She had then six permanent molars in the lower jaw, and the wisdom teeth were just coming through. These were now fully erupted. Mr. White had been obliged to extract the stump of the right six-year-old molar about fifteen months ago, the crown having been destroyed by caries; but there were still seven permanent molars in the lower jaw, and there had been eight erupted. There were, however, only two lower bicuspid; the place of the second bicuspid on each side being occupied by a large molar. The teeth in the upper jaw were normal. The patient's parents and brothers and sisters presented nothing unusual as regards dentition.

MR. HERN showed a vulcanite plate which had been made by Mr. Ernst Sjöberg, a student of the Dental Hospital of London, for a patient whose right superior maxilla had been

removed at King's College Hospital on account of a malignant growth, and read notes of the case.

The operation was performed on July 18th last by Sir Joseph Lister, the whole of the right upper maxilla, together with part of the cheek and nose being removed. Early in October the patient was sent to the Dental Hospital of London with a request that he might be provided with a vulcanite piece to fill up the palate, after which, he was told, "he would only require a piece of sticking plaster to cover the wound."

When the patient presented himself at the hospital he was in a most pitiable condition. He was unable to articulate on account of the loss of air through the opening in the cheek; he was unable to masticate properly on account of the absence of the teeth and alveolar process on the right side of the mouth; and further, owing to the removal of the floor of the orbit, the eye had sunk, thus throwing the axes of vision of the two eyes out of harmony, and giving the patient the additional inconvenience of diplopia. Mr. Sjöberg undertook the case, and set himself to remedy these defects. Models of the mouth were taken in Stent's composition and plaster casts obtained. There was some difficulty experienced in taking the models and getting the articulation, owing to the loss of the right maxilla, the tenderness of the granulations, the great flaccidity of the right upper lip, and the low state of the alveolar process, the patient, who was sixty-eight years of age, having been edentulous for fifteen years. In fitting provisional plates an appendix of wax was made to project into the nasal cavity, which gave greater steadiness; this was cut away before vulcanising.

A complete set of teeth was made and retained by springs. On the upper plate an appendix of hard gutta-percha was built, similar to that for the wax trial plates; this was slightly altered daily, until a good fit was obtained. After a month's use it was replaced with hard rubber.

An attempt to model the external opening was next made, the lips and soft parts being now kept in position by the plates and teeth. The opening in the cheek was modelled

with plaster, and whilst this remained *in situ* its surface was oiled and a plaster model of the face was taken. These together provided a correct model of the parts to be covered. To this cast a wax core was modelled restoring the original contour of the face and nose. This was thin except where it served as a floor to the orbit, in which position an appendix was built to support the eye, and it was hoped subsequently to correct its position. The wax core was tried on the patient and carefully fitted; it was then reproduced in vulcanite. A spectacle frame was made to suit the patient, having soldered to the inner part of the right eye-piece a metal tongue, which was attached to the vulcanite apparatus by two small screws. A moustache was also fitted to hide the scar and rather contracted appearance of the right side of the mouth. Finally the vulcanite apparatus was painted over with oil colour to match the patient's complexion as nearly as possible. He wore the apparatus for about three months, and with it he could not only speak clearly and masticate well, but was also greatly improved in appearance. It was, however, found impossible to restore the eye to its proper position, so as to get rid of the double vision. Unfortunately a recurrence of the disease began to show itself in January; a second operation had since been performed at St. Bartholomew's Hospital, and the use of the apparatus had therefore been discontinued for the present.

MR. OAKLEY COLES said he had found it almost a hopeless task to attempt to raise the eyeball so as to restore the proper axis of vision when, as in Mr. Hern's case, dropping of the eyeball had occurred owing to the removal of the floor of the orbit. Having had a good deal of experience in the treatment of these cases it might be worth while to state some of the views at which he had arrived. He found paraffin wax the best material to take the final impressions with, and he found celluloid a better material than vulcanised rubber for the piece itself. At one time he used rubber, putting, if the plate was large, a piece of pumice, cut to shape, in the centre to lighten it; but he now preferred celluloid. The surfaces,



and especially the edges, should be very carefully trimmed and polished.

MR. HENRI WEISS said that in all cases where plates had to be made to supply losses occasioned by malignant disease, it was important that the greatest care should be taken to avoid every possible source of irritation, since anything of this sort would be very liable to bring about a recurrence of the disease. When the parts to be restored had been lost by gun-shot or other accidents, this extreme care was not so necessary, but in the case of patients who had been the subject of malignant disease every possible source of irritation must be thought of and guarded against.

MR. TURNER said it was only since the introduction of rubber for dental purposes that it had been possible to supply such an apparatus as that shown by Mr. Hern easily and cheaply, and it was only comparatively recently that their use had become common. No doubt lost features could now be reproduced with great success, so far as the improvement of the patient's appearance was concerned. He had had some experience of this kind of work himself, and he had come to the conclusion that the great object to be attained was to restore the air passages as nearly as possible to their natural condition. Before these contrivances were as common as they were now, such cases as that described by Mr. Hern were, as a rule, soon carried off by bronchitis or pneumonia. So long as this important function was properly fulfilled æsthetic considerations were quite secondary.

MR. HUTCHINSON said he quite agreed with the opinion expressed by Mr. Henri Weiss. He thought that in the case of patients who had been the subject of malignant disease it was seldom advisable to mould large portions of the face, since this could not be done without making a somewhat large and heavy piece, which must necessarily exert pressure on the surrounding structures, and might thus cause a recurrence of the original disease.

MR. STORER BENNETT showed a couple of agate burnishers which he used when filling teeth by the Herbst method. The

advantage of using agate instead of steel burnishers was that whilst the latter became quickly coated with gold, and had to be frequently cleaned, either on a block of tin or with fine emery cloth, the agate did not take up the gold, and a good deal of time was thus saved. The agate burnishers which he had first tried were very easily broken; those he now showed them were much stronger, and were in all respects well adapted for the purpose for which they were intended.

MR. CHAS. TOMES said he had tried to get Messrs. Ash to make some burnishers for use in the Herbst process by coating burs with their tooth body, but there seemed to be some difficulty in the way. He had, however, got Mr. Baldwin to make a very serviceable one by taking a tooth in which the pins were far apart, chipping and grinding it away till a boss around one pin was left, then chucking it by the pin in a needle chuck mandril, finishing it off quite true and then polishing it. It gave little trouble to make, and answered its purpose well, since it could be used for three-quarters of an hour without becoming gilded. He hoped Messrs. Ash would soon have some made of this material.

MR. CHARLESWORTH then described some interesting specimens of fossil teeth from the Museum of the Society, illustrating his descriptions by means of diagrams; but the Publishing Committee not having received any abstract of his paper up to the time of going to press, have deemed it inexpedient to further delay the issue of the current number of the Transactions.







# Odontological Society of Great Britain.

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## ORDINARY MONTHLY MEETING.

*April 13th, 1885.*

C. SPENCE BATE, F.R.S., PRESIDENT, IN THE CHAIR.

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THE Minutes of the previous meeting having been read and confirmed,

THE PRESIDENT announced that MR. CHAS. ALFRED ROBERTS, L.D.S.Eng., of 44, Devonshire Street, Portland Place, had been duly nominated as a candidate for election, and would be balloted for at a subsequent meeting.

THE following candidates were then balloted for and elected Resident Members of the Society :—

MESSRS. HERBERT STEPHEN PARKINSON, L.D.S.Eng.,  
36, Sackville Street, W.; and  
WILLIAM PENFOLD, L.D.S.I., 30, York Street,  
Portman Square.

MR. WEISS (Librarian) announced that by the liberality of the Council he had been enabled to purchase the following works, several of which were very scarce, and all of them valuable additions to the Society's Library :—

1. Linderer, Handbuch der Zahnheilkunde; Berlin, 1837.
2. Ditto, ditto (2nd Ed.), in two vols.; first vol. published in 1842, second in 1848.
3. Linderer, Die Zahnheilkunde nach ihrem neuesten Standpunkte; Erlangen, 1851. (Contains a complete Index of Dental Literature up to 1851.)

4. Carabelli, Systematische 'Handbuch' der Zahnheilkunde; Vienna, 1844. 2 vols., and Atlas with 34 copper-plate engravings bound in one volume. (A very interesting and valuable work.)
5. Frankel, Dissertatio de penitiori Dentium Humanorum Structura; Breslau, 1835. (Very rare.)
6. Bruck, Die Angeborenen und Erworbenen Defecte des Gesichtes, der Kiefer, des harten und weichen Gaumen; Breslau, 1870. ("Congenital and Inherited Defects of the Face, Jaw, and Hard and Soft Palate"; very interesting.)
7. Blume, Der Pracktische Zahnarzt; Berlin, 1836.
8. Brunn, Ueber die Anwendung der Narkose in der Zahnheilkunde; Freiburg, 1857. (On the Use of Anæsthetics in Dentistry.)
9. Bruck, Operative Zahnheilkunde; Leipsic, 1861.
10. Bruck, Das Stomatoscop; Breslau, 1865.
11. Bauer, Die Zahnaerztliche Technik der Engländer; Berlin, 1852.
12. Kneisel, Der Schiefstand der Zähne; Berlin, 1836.
13. Frisoni, Etwas von dem Gegenwärtigen Stande der Zahnheilkunde; Stutgard, 1847.
14. Schütz, Die Pflege der Zähne; Leipsic, 1876.
15. Sauer, Versuche mit Stickstoff oxydul-gemischen zu Anæsthesiren; Nuremburg, 1869.
16. Ungebaur, De Dentitione Secunda Juniorum; Leipsic, 1738.

MR. HUTCHINSON said he had received from Mr. Percy May a model showing a supernumerary tooth erupted between the upper central incisors, and another showing a typical syphilitic central and lateral.

Messrs. Ash had sent a pair of old forceps of very curious design, and Mr. Newland Pedley had presented to the Society a complete set of the instruments which he used for the application of Hammond's splint. He (Mr. Hutchinson) thought that these would serve a more useful purpose if they were placed at the disposal of the staff of the hospital, rather than locked up in a case in the Museum.



MR. GREGSON suggested that they should be kept in the Museum, but in a separate case, which should be left open, so that they might be available for the use of the surgeons of the hospital when required.

MR. TURNER thought that these arrangements had better be left to the discretion of the Council.

MR. NEWLAND PEDLEY then made a communication with reference to the use of Hammond's splint after surgical section of the lower jaw.

He was called upon in January last to apply a Hammond's splint for a man whose lower jaw had been divided in order that an epithelioma situated in the floor of the mouth might be the more completely removed. The case was almost precisely similar to that which he reported in the Society's Transactions about a year ago, and which led him to suggest, in a paper which he subsequently read, that the line of section through the bone should not be vertical. Both patients were under the care of Mr. Clement Lucas, of Guy's Hospital, and in the latter case he kindly made the line of division by two oblique cuts of the saw, meeting at an angle. This greatly facilitated Mr. Pedley's work, and although there were no available teeth behind the bicuspid region, he was enabled to fit a modified Hammond's splint without the assistance of a model.

Fibrous union took place rapidly, but ossification progressed slowly; this was, however, sufficiently accounted for by the fact that a large area of periosteum near the line of division had to be removed with the growth.

MR. HENRI WEISS then read the following communication:—

“At the meeting of this Society held in January, 1884, Mr. Bland Sutton read a most interesting paper on Comparative Dental Pathology, in the course of which he mentioned a case in which there had been extensive erosion of the crown of an unerupted tusk found in the jaw of a female elephant. It was conjectured that the erosion was due to

the presence of the larva of a dipterous insect; but the fact that the tooth had not pierced the gum was rather against the acceptance of this view.

“In the discussion which followed, Mr. David Hepburn stated he had never known absorption or erosion to occur except when the tooth had appeared through the gum. And during the passage of the specimen round the room, it was noticed that the apex of the crown had been subject to a considerable amount of friction, showing that at some period it had appeared through the mucous membrane.

“I, Sir, have been fortunate enough to meet with a case in which the left upper canine had endeavoured to take up its position in the mouth of a patient aged forty-five, but was resisted by a denture she was wearing at the time. This opposition led to inflammation and suppuration of the investing dental membrane. I removed the tooth without much difficulty, and upon examination discovered deep excavations on its lingual aspect which I at first took to be ordinary caries, but ultimately concluded to be the result of absorption. It would have been interesting to have retained it as a wet specimen, as the cavities were filled with an organised pulpy mass, but I regret to say it became damaged by keeping.

“The chief point in this case is the testimony it brings to bear on the condition of unerupted teeth. It has been suggested that where teeth are missing, it is probable that after their partial or complete development they have become absorbed. But from the numerous dissections which have been made disclosing the presence of unerupted teeth, and these cases in which absorption has taken place only after they have pierced the gum, the evidence is strengthened that if once a tooth is developed, it is either erupted, lies dormant, or gives rise to a dentigerous cyst.”

MR. DAVID HEPBURN exhibited, on behalf of Mr. T. S. Carter, of Leeds, an Oral Spoon invented by that gentleman for the purpose of preventing teeth or stumps from finding their way into the larynx during operations under anæsthe-

tics. An illustration of it appeared in the January number of the Journal of the British Dental Association.

The PRESIDENT then called upon Mr. Bland Sutton to read his paper on "Injuries and Diseases of the Jaws in Animals."



COMPARATIVE DENTAL PATHOLOGY.

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*Injuries and Diseases of the Jaws in Animals.*

BY J. BLAND SUTTON, F.R.C.S.ENG., Lecturer on Comparative Anatomy, Middlesex Hospital Medical School.

HAVING attempted on two previous occasions to make some additions to our scanty knowledge concerning diseases of the teeth in animals, I thought it would be advisable in the present paper to supplement my previous communications by such evidence as could be collected on the subject of "injury and disease" of the jaws. Scattered among the transactions of societies and periodical literature are many cases of great value and interest in their bearing on this question. Besides these sources, the museums contain specimens interesting and full of instruction, for they go to show that animals in their natural "wild state" do suffer from disease, often very severe and extensive, affecting animals from the size of a field mouse to that of the largest mammal that moves—the mighty whale. Evidence will also be adduced respecting the antiquity of disease, which will undeniably prove that civilization is not the

only cause of disease in the human being, but that it is one of his "birthrights."

In addition to facts gleaned from every available source, I shall add those which have come under my own observation.

For convenience of description, the subject will be arranged in the following order:—

1. Malformations.
2. Injury and its results.
3. Atrophy.
4. Hypertrophy.
5. Morbid growths, including under this heading—(a) Cystic tumours, (b) Osseous tumours (Exostoses), (c) Sarcomata, and (d), lastly, the disease known as Actinomycosis, which, strictly speaking, ought to be regarded as a general disease, but as the jaw is often a seat of its manifestation it has been included in this list.

### MALFORMATIONS.

Deformities of the jaws are of serious import in regard to the life of the young animal; for not only must the upper and lower jaws be perfectly formed, but they need be symmetrical, for any disproportion between the relative size of the upper and lower maxillæ necessarily entails, in mammals, difficulty in the all-important act of grasping the nipple of the mother.

The malformations of the parts in question vary

from a slight cleft in the hard palate to total deficiency of one or all the maxillæ. The subject may be arranged for description as follows :—

- |                     |   |                         |
|---------------------|---|-------------------------|
| 1. Superior Maxilla | { | Absence.                |
|                     |   | Variation in size.      |
|                     |   | Cleft Palate.           |
| 2. Inferior Maxilla | { | Absence.                |
|                     |   | Variation in size.      |
|                     |   | Abnormalities in shape. |
| 3. Teratomata.      |   |                         |

### 1. *Superior Maxilla.*

(a) *Absence.*—This is a rare defect, and probably rarely occurs alone, but is always associated with arrest of growth of the entire facial skeleton. The occurrence of this deformity is attested by some specimens in the Museum of the Royal College of Surgeons,—an eel, a carp, and the head of a foetal chick. It has also been seen in geese and ducks. The absence of the maxillæ in carp is remarkable, for Saint-Hilaire mentions that malformation of the face in these fish is so extremely common, that the Germans distinguish carp deformed in this way as *Mopskarpfen*, literally, pug-nosed carp. Many observers have noticed this peculiar deformation in carp, including Gesner, Mayer, Réaumur, Hamberger, Otto, Valenciennes, and Rayer.

Gurlt has figured a case which occurred in a lamb.



The lower jaws, though mis-shapen, have attained ordinary dimensions ; but the superior maxillæ are not represented, and there is arrested growth of the remainder of the face and skull.



FIG. 1.—Head of a duckling showing absence of the superior portion of the beak. The lower part is well formed. There was no cranial vault.

In the accompanying drawing, Fig. 1, is represented the head of a duckling which came under my notice. In this instance there is complete absence of the upper mandibles, whilst the lower pair are to all appearances perfectly normal. In this specimen the vault of the cranium is wanting and the brain protrudes. There was in addition considerable abnormality of the abdominal viscera. Guy's Hospital Museum contains the skeleton of a foetal pig with absence of the superior maxilla ; the malar bones of opposite sides meet in the middle line.

(b) *Variations in Size.*—I. Geoffroy Saint-Hilaire points out that the upper jaw is less frequently affected than the lower, so far as normal volume is concerned. This observer states that he had never seen a case in which the upper jaw had exceeded normal dimensions, and it is also very rare that it does not attain to them.

He relates a case, however, in illustration of arrested growth which occurred in a lamb; the superior maxilla was not only too short, but deviated laterally.

I have seen in a foetal goat, which survived its birth only a few days, the premaxilla so short that the lower jaw projected an inch beyond the upper one. The condition was associated with enlargement of the thyroid gland. In all the recorded cases of this condition I have been able to come across, the deficiency seems to have affected the premaxilla rather than an actual shortening of the maxilla itself.

In an interesting case reported by Paul Gervais in a foal, born in the Argentine Confederation, which had a hydrocephalic cranium, there was total deficiency of the premaxillæ. But among the most curious and remarkable instances of perpetuation of a vice of conformation of this character must be noticed the deformity exhibited by those fancy dogs (King Charles's breed) in which the lower jaw projects a considerable dis-

tance beyond the upper. In these dogs the deformity is due to stunted growth of the pre-maxillæ.

Saint-Hilaire met with a singular deformity of the superior maxillæ, consequent on absence of the lower jaws, in a calf. The upper jaws were so twisted that, instead of the teeth on either side being arranged vertically and parallel to one another, they were directed horizontally inwards and towards one another, so that the crowns of the molar teeth of opposite sides met across the middle of the hard palate.

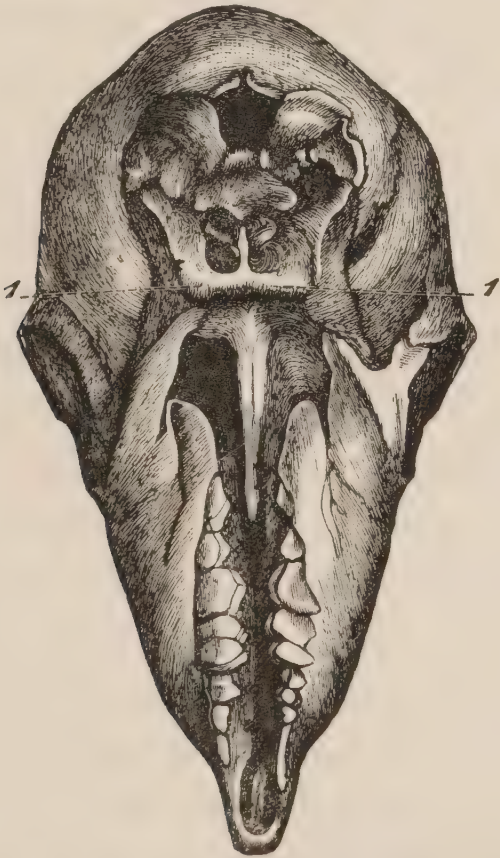


FIG. 2.—The skull of a lamb affected with agnathia, absence of the lower jaw (after Gurlt).



A condition corresponding to this case of Saint-Hilaire's, except that the crowns of the teeth do not quite meet, is represented in Fig. 2, which is taken from Gurlt's elaborate work, "Ueber Thierische Missgeburten." It is described as *Perocephalus agnathus*, or head without a lower jaw, and Gurlt has collected evidence of thirty-four examples, in lambs, swine, and calves.

*Parrot Mouth.*—Horses are liable to have the premaxilla somewhat more projecting than normal, so as to cause the upper incisors to project unduly and overhang the lower set. In some cases this may amount to  $1\frac{1}{2}$  inches. On account of the resemblance the deformity has to a parrot's upper bill, the name parrot mouth has been given to it. In severe cases the deformity causes the animal considerable inconvenience when grazing. The lower incisors, from lack of antagonism, may grow unduly and sometimes occasion injury to the roof of the mouth. Under these conditions it is necessary to rasp them down.

*Cleft Palate.*—The occurrence of fissures in the palate is in man very frequent; the evils which result therefrom are so marked, and the life of the infant so often endangered thereby, that the subject has naturally attracted a very considerable amount of attention, not only from practical surgeons, but also from anatomists and embryologists. It is satisfactory to know that this

deformity is not confined to man, but in all its forms has been found in the lower animals. It is by far the most common malformation to which the jaws are liable, and may vary from a slight cleft affecting only part of the palate to a complete fissure extending throughout its whole length, and at the anterior end may bifurcate so as to completely isolate the premaxillary bones, and leave them jutting forward on the end of the median septum.

The occurrence of cleft palate has been found in horses, calves, dogs, and lions living in captivity. Examples occurring in birds have been recorded where the upper mandible has been found cleft in twain.

#### THE INFERIOR MAXILLÆ.

(a) *Absence*.—Total deficiency of both lower jaws is recognised by teratologists as *Agnathia*. Some good examples of this malformation exist in the Museum of the Royal College of Surgeons, London, in a pig and in lambs. This deformity leads to other changes in the skull, such as approximation of the eyes and ears; the latter nearly meet one another under the base of the skull, a condition known as *Synotia*. In addition there is contraction of the posterior part of the cranium.

Förster figures two cases, and Ahlfeld gives a drawing illustrating the condition, and affords

references to many others. Gurlt, in his exhaustive work previously mentioned, gives some admirable figures of this remarkable condition, occurring in lambs, pigs, and calves. *Semi-agnathia*, or deficiency of one-half of the lower jaw, is very rare. Mr. F. Eve has described a case which occurred in a lamb. In this case several of the facial bones were absent or defective, including the upper maxilla and the associated bones. The defect was on the right side. Mr. Eve, insisting on the rarity of the condition, states that no mention of the deformation occurs in the standard works on teratology of Geoffroy Saint-Hilaire, Gurlt, Förster, or Ahlfeld.

(b) *Variation in size*.—Excessive development of the lower jaw is rare, and in suspected cases it is necessary to discriminate between excess of development of the inferior maxillæ or arrest of growth in the superior maxillæ. Saint-Hilaire has described and figured a singular case in a canary, where the upper mandible was of normal dimensions, but the lower was twice as long as usual.

Defective development is the condition more frequently met with. Saint-Hilaire mentions two cases which occurred in deer born at different times from the same mother. In these examples the lower jaws were one-fourth shorter than usual. The same observer alludes to a case occurring in a dog.



(c) *Abnormalities in shape*.—The Museum of the College of Surgeons possesses an interesting example of malformed lower jaws in a calf, which should be mentioned here. The skull is somewhat shorter and broader than normal, and the rami of the mandibles are so curved as almost to form a semicircle. This deformity is not rare.

In some animals, particularly the horse, the lower jaw is liable to a curious malformation, which has a singular effect upon the teeth.

The deformity consists in the rami of the lower jaws being unusually near together, this producing as a consequence unnatural approximation of the two rows of lower molars, the upper rows of teeth maintaining their normal positions. When this occurs, instead of the crowns of the upper and lower molars meeting each other over the whole extent of their surfaces, the inner surface of the upper teeth and the outer half of the crowns of the lower teeth alone come into contact during mastication. The result of this partial wear causes the outer edge of the upper teeth to elongate in such a manner as to hinder, or prevent, the lateral grinding movements, and if the unworn portions attain any great length their projecting portions may effect serious injury on the maxillæ, as it leads to inflammation of the gums and the underlying alveolar processes.

Varnell has well described the condition in the

pages of the "Veterinarian," and the Museum of the Royal Veterinary College contains some very striking illustrations of it from the horse. In the most marked example contained in that collection, the molar teeth in the upper and lower jaws have sharp trenchant crowns, not broad and flat as is usually the case; the teeth are from two to three inches in length, and those in the lower jaw play inside the upper set, so that in their action the two sets glide over each other like the blades of shears. In consequence of this, when the jaws are closed the upper set of teeth are alone visible, and completely hide the lower molars.

Such a marked degree of this abnormality as the one quoted above is of course very rare; minor degrees of the deformity occur with tolerable frequency, requiring the redundant portion to be cut off or levelled with a rasp.

I have seen examples in a slight degree of this affection in deer, in which unequal play of the teeth upon one another had led to the formation of an abscess in the maxilla.

#### TERATOMATA.

Among the most remarkable examples of malformations to which the jaws are liable must be mentioned the attachment of imperfectly formed or "parasitic" foetuses, as they are termed by tera-

tologists, in contradistinction to the “autosite,” or individual who is the unfortunate bearer of such a mass. The malformation presents itself in two distinct forms:—

(1) *Epignathia*, and (2) *Hypognathia*. The etymology of these terms is sufficiently obvious.

(1) *Epignathia*.—In this variety the parasite, excessively modified, is attached to or impacted in the hard palate. Usually it forms a lobulated tumour, consisting of bones, fat, skin, teeth, nervous tissue, lanugo, and foetal tissues, all jumbled into an irregular conglomerated mass.

Up to the present time I have come across no specimen of this curious condition in the lower animals in any museum; but the condition is by no means rare in man. Ahlfeld, in his work “*Die Missbildungen des Menschen*,” has collected accounts of no less than forty of these cases. The Hunterian Museum possesses an admirable specimen illustrating the malformation.

(2) *Hypognathia*.—In this malformation the attached foetus occupies the inferior maxilla. Saint-Hilaire has recorded two examples of this condition in calves. In one case the animal was exposed to public view in Paris. The deformity consisted of an accessory head attached to the lower jaw. Saint-Hilaire had no opportunity of examining the anatomical details of the specimen; the only good service the calf seemed to get from



the abnormal mass was to use it for the purpose of scratching its flanks.

This deformity is very rare in animals, but a goodly number have been recorded as occurring in children. Last summer I observed a very typical case at Stockton-on-Tees. The mass grew from the lower jaw of a child, which was in other respects healthy, and seemed likely to live.

### INJURIES OF THE JAWS.

Under this heading it will be convenient to describe two distinct classes of injury. First, those depending on direct violence to the bones themselves. Secondly, the destruction and deformity consequent on alveolar abscess.

1. *Direct Violence*.—The “Veterinarian,” Vol. XXII, contains accounts of fracture of the jaw in horses. In the first case a horse bolted and ran its head against some stone pillars, knocked out some of the front teeth, and fractured its upper maxillæ. These were wired together and the animal made a good recovery. In the second case a mare with a “parrot mouth,” that is, with the superior maxillæ extending beyond the lower one, was fastened by a bridle to a ring in the wall. For some reason or other, whilst fastened in this position, it ran back and broke the whole of the anterior portions of the superior maxillæ from the body of the bone. The parts were replaced and

fixed by wire fastened to the teeth, and the animal, after exfoliating one or two pieces of bone, made a good recovery.

One of the evil results of fractured jaw is represented in Fig. 3. It is the right inferior

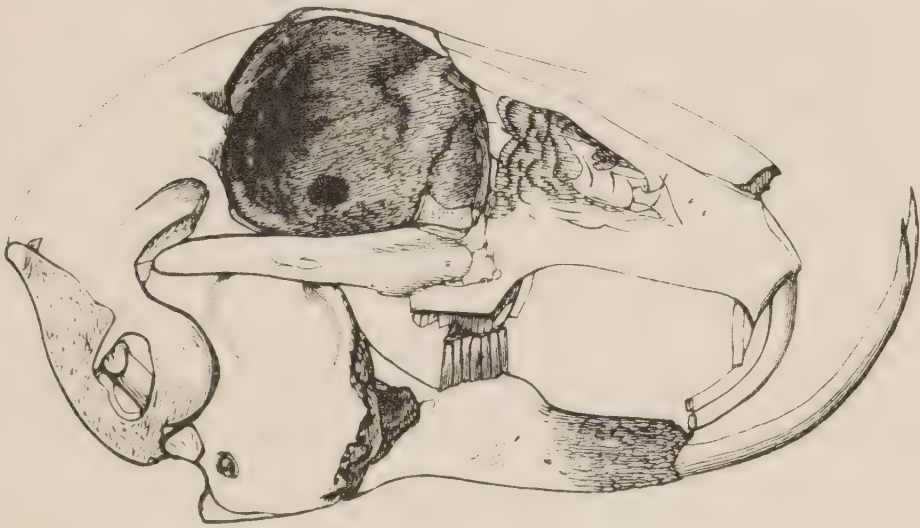


FIG. 3.—Skull of a rabbit with ununited fracture of the lower jaw, which has led to non-apposition of the incisors, and overgrowth in consequence.

maxilla of a rabbit, which had from some cause or the other sustained fracture at the junction of the body with the ramus. No union has taken place, and, judging from the rounded appearance of the opposed surfaces of the fragment, it would seem that the injury must have been of some standing, and that a false joint had been formed. In consequence of this lateral deviation of the maxilla apposition of the incisor teeth had been interfered with, and the lower set had grown excessively. The upper incisors are longer than

usual, and their sharp edges came into contact with the gum of the right lower inferior maxilla, leading to inflammation and the deposition of new bone from the inflamed periosteum. Some of these molars have also exceeded their length, where they failed to meet the upper set in consequence of the lateral deviation.

Overgrown incisors in rodents, as a consequence of injury to the teeth themselves, are of the most frequent occurrence, but excessive length as a result of fractured jaw is not by any means common.

Vol. XIX of the "Veterinarian" contains the details of a remarkable case of diseased skull in a horse. The specimen came from Sydney. It appears that in the year 1862 the horse, a wild entire, was roped, and when haltered he broke out of the yard and got away with the halter on. The horse was never recaptured. In the year 1865 the skull was found on the top of a high range of hills, with the halter still upon his head.

The horse was supposed to have been four years old when he broke loose, and as the teeth now denote him to be rising seven, it would appear that he had lived nearly three years with his jaws imprisoned in the halter. As may be seen from Fig. 4, the rope is lodged in a deep canal, surrounded by a large deposit of new bone.

Veterinary literature contains some exceedingly



interesting cases of fractures of the maxillæ in horses and dogs, in which treatment has been

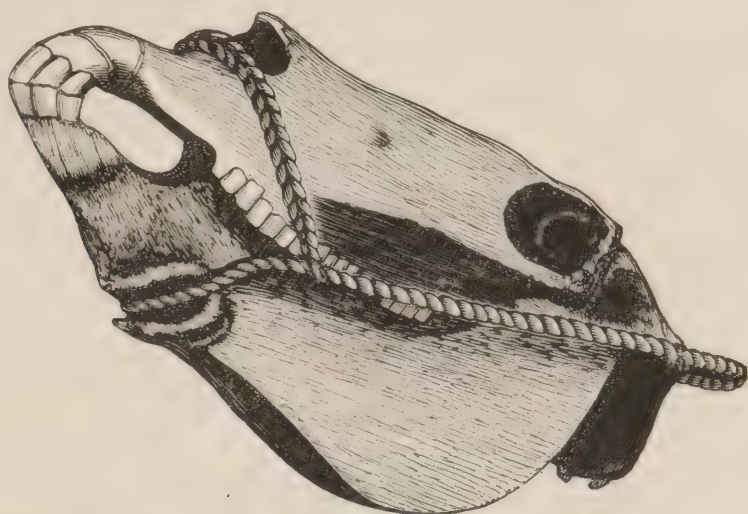


FIG. 4.—Skull of a horse which lived in a wild state for three years with the rope halter over its head. It had deeply eroded the maxillæ.

successfully carried out. The favourite method of adjusting the fractures appears to be the plan of wiring, now so commonly used in fractured jaws occurring in man.

Dr. Murie has collected and published in the "Proceedings of the Zoological Society," 1865, some interesting cases illustrating a peculiar deformity of the lower jaw found in the cachalot, *Physeter macrocephalus*. The abnormal condition of the jaw of this whale has been described by Beale, in the "Natural History of the Sperm Whale," in the following words:—"The deformity consisted in the symphysis and anterior half of the body being twisted at nearly right angles to the ordinary

direction of the bone. The ramus was perfectly normal, and the body from thence onwards to about its middle seemed quite natural. From this latter part, however, it took a quick curve outwards, almost rectangularly; then with a second larger sweeping curve it bent itself somewhat backwards, and further on, towards the anterior end of the symphysis, it again curved itself a short way forward." A very good notion



FIG. 5.—The lower jaw of a sperm whale, showing a deformity to which these whales are liable (after Murie).

of the way in which the jaws were curved may be inferred from the specimen represented in Fig. 5.

The Museum of the College of Surgeons, London, possesses an example of this deformity. The specimen is thus described :—

“The right ramus of the lower jaw of a *Physeter*, the anterior part of which is strongly curved outwards and backwards, in consequence of some injury during youth.”

Dr. Murie also gives a figure and description of a similar specimen in the British Museum ; the figure is reproduced on page 174.

The two halves of the jaw are complete but separated from each other ; their size shows the animal to have been young. The length of the two placed in juxtaposition, in a straight median line from opposite the posterior end of the rami to the anterior surface of the bend, is about 65 inches, while the measurement, following the curve, of the right half to the tip of the jaw is 93 inches. Their anterior fourth has a curve towards the left side, in shape not unlike a shepherd's crook, and they have besides a twist on themselves.

The bones presented in places the characteristic appearance of a bone affected with periostitis. The right bone is hollowed and atrophied at the bend, and normal in density at the anterior part of the symphysis ; while, on the other hand, the left side



has its bend considerably hypertrophied and the tip atrophied.

Professor Flower mentions the existence of a similar specimen in the Museum of the Literary and Philosophical Society, Hull. We must now consider the cause of this curious condition.

Old whalers affirm this to be due to fighting. The sperm whales rush head first one upon the other, their mouths at the same time widely open, their object appearing to be the seizing of their opponent by the lower jaw, for which purpose they frequently turn on their sides. In this manner they become as it were locked together, their jaws crossing each other, and in this manner they strive vehemently for the mastery.

These whales are fat, and in as good condition as those with normal jaws.

The matter has also been investigated by Fischer, who has contributed a paper on the subject in the "*Journal de l'Anatomie et de la Physiologie*," 1867. He describes an example of this deformity, in the collection of Comparative Anatomy in the Museum de l'Histoire Naturelle de Paris, affecting the lower jaw of a young cachalot from the Indian Sea. The total length of the jaw following the curve is 2·20 m. The normal portion measures 1·70 m., the curved portions consequently 50 centimetres.

Fischer's paper is valuable, for he has added an account of the microscopical characters of the bone,

with the assistance of Ranvier. Sections made from the straight portion of the jaws, when compared with those from a healthy bone, are found quite normal in structure, whereas sections taken from the abnormal region of the twisted maxillæ show advanced osseous lesions of the nature of rarefying osteitis. In the alveoli of the affected portion of the bone, there are nodules of new bone; indicating not only that repair had taken place, but also that the abnormality was of long standing.

There are now no less than seven of these curiously twisted jaws described in anatomical literature. Beale has given an account of two, Murie refers to three others, Flower mentions one at Hull, and lastly there is the case of Fischer. The last writer states that there is nothing to prove the abnormality to result from traumatism; there is no trace of fracture, and the deformation is not limited to any one spot, but attacks a considerable extent of bone.

A careful examination of the specimen in the Museum of the College of Surgeons, London, has satisfied me that the deformity in that case is not due to injury; the careful and detailed description given of some of the examples by Dr. Murie still further supports that opinion, although that writer inclines to the view that injury is the cause of the deformity. There only remains the alter-

native that they are congenital deformities, and on this point there is very strong evidence.

The skulls of those *Cetacea* included in the great division *Delphinoidea*, which embraces the Dolphins, Porpoises, and Cachalots, present in most species a marked want of symmetry in their crania.

This peculiarity is most marked in the case of the great sperm whale or cachalot, *Physeter macrocephalus*.

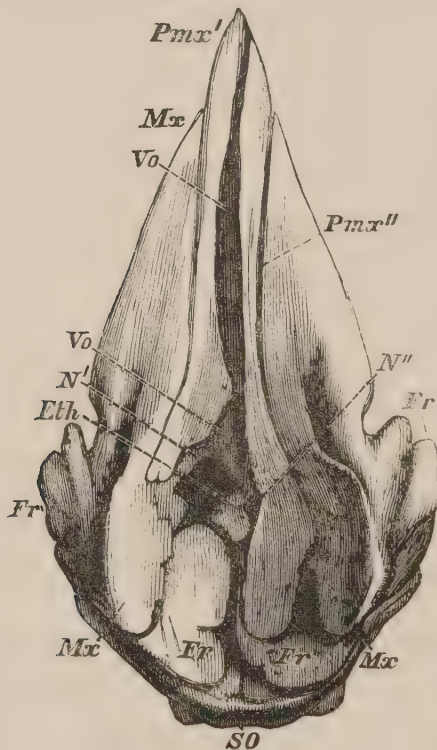


FIG. 6.—The skull of foetal sperm whale, to show the asymmetrical condition of its skull. This is most marked about the narial apertures, N' N'' (after Huxley).

In the specimen of the foetal cachalot (Fig. 6), the right premaxilla is much longer than the left,



extending far back upon the right frontal, while the left does not reach the left frontal. The left nostril, on the other hand, is much more spacious than the right. Professor Flower, in his "Osteology of the Mammalia," states that this want of symmetry is seen especially in the neighbourhood of the anterior narial apertures, of which the left is very much larger than the right.

Taking all these facts into consideration, and remembering that there is no reliable evidence of injury upon any of these peculiar jaws, it will be far safer to regard the deformity of the jaws as a congenital defect rather than the result of injury.

An interesting example of injury to the lower jaw, and recovery therefrom in a fossil animal, is

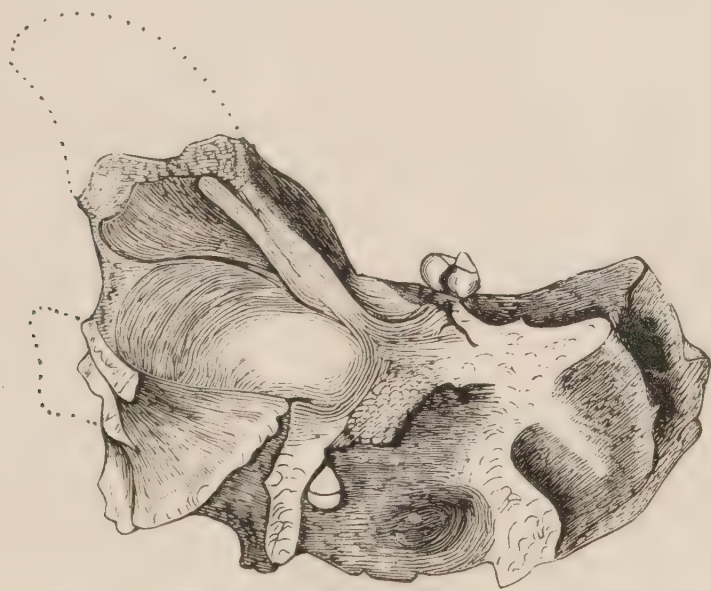


FIG. 7a.—The lower jaw of an extinct species of wolf, showing the effects of injury and recovery therefrom.

recorded in the "Philosophical Transactions," 1823, by Mr. Clift. Professor Owen, in his "History of the British Fossil Mammalia," p. 126, has given an abridged account of this specimen, from which the following details, and Fig. 7a, are culled :—

The bone was found in the quarry at Oreston, near Plymouth, produced by the removal of an entire hill of limestone for the construction of the breakwater. The bone is referable to a wolf, or larger species of *Canis*, and belonged to a young, but nearly full-grown animal. The diseased condition is probably the result of injury inflicted by the bite of a stronger animal; the jaw is enlarged by deposition of bone and ulcerated near the angle, which is perforated at *a* by the ulceration consequent upon an abscess or sinus which has eaten through the bone.

At page 464 the same distinguished writer



FIG. 7b.—The inferior maxilla of an extinct species of deer, *Megaceros hibernicus*, showing the effects of an alveolar abscess (after Owen).

refers to another interesting example of primeval disease which occurred in the lower jaw of the gigantic Irish deer, *Megaceros hibernicus*, which was contained in the collection of the Earl of Enniskillen.

The specimen is represented in Fig. 7b. A large part of the outer wall has exfoliated, and a considerable amount of new irregular osseous matter has been formed to replace the lost portion of the bone. Professor Owen attributes the injury to a blow on the part, probably received in combat at the rutting season. I am disposed to regard the diseased condition as secondary to dental irritation, for all the deer tribe are exceedingly liable to inflammation and suppuration of the pulp, leading to alveolar abscess with periostitis, necrosis, and exfoliation of the dead and deposition of new bone; so that this specimen seems to afford additional evidence that the teeth are a very old source of trouble to their possessors, and also strong evidence concerning the antiquity of such disease.

*Alveolar Abscess.*—This is a very fertile source of trouble for the jaws of animals. On previous occasions I have adduced evidence and exhibited specimens to show that at any rate the majority of these abscesses are the result of inflammation of the pulp of a tooth, due to an injury inflicted on the teeth or to caries, but more commonly the former.



In animals the large size of the pulp, the difference in anatomical disposition of the teeth, and the lack of surgical aid render the affection a formidable one in many cases. A careful study of specimens shows how destructive these local inflammations may be, not only to the maxillæ themselves, but even bringing about the death of the afflicted animal, either by inhalation of the putrid material, or the creature, in its fury caused by pain, rushes against obstacles and brings about its own destruction. Alveolar abscess has been observed in the following animals: monkeys, carnivora, deer of all kinds, opossums, kangaroos, rodents.

For detailed examples and drawings of cases see my previous papers on Comparative Dental Pathology.

Alveolar abscess is not the only cause of necrosis and inflammatory thickening of the jaws. Thus in the case of an agouti, *Dasyprocta agouti*, which came under my notice, the root of the left

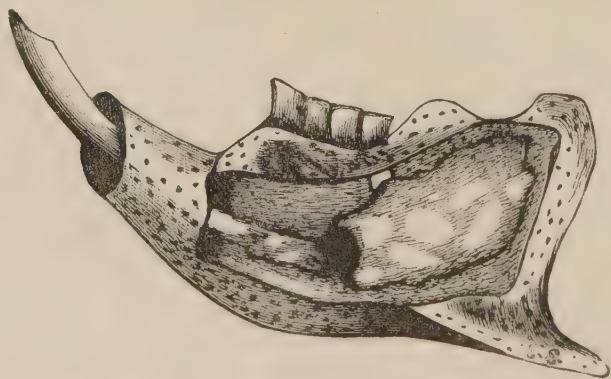


FIG. 8.—Lower jaw of an Agouti, *Dasyprocta agouti*, with an odontome on the lower incisor.

lower incisor was found to be surrounded by an odontome of the shape and size represented in Fig. 8.

This tooth-tumour had blocked up the fang of the tooth, and the pulp chamber was filled with secondary dentine. This led to necrosis of the anterior part of the tooth, and the dead tooth had in its turn acted as a foreign body, ending in an abscess giving rise to considerable absorption of the bone on the inner side, and a large deposition of new bone on the outside giving rise to considerable thickening of the body of the maxilla. The tooth could easily be traced to the odontome, which was composed of cementum with patches of dentine here and there.\*



FIG. 9.—An odontome attached to the tusk of an elephant.  
The growth of the tusk has been arrested.

\* As on other occasions, the credit of preparing sections of these hard tissues belongs to my friend Mr. J. J. Andrew, of Belfast.

The odontome represented in Fig. 9 growing around the tusk of an elephant seems to correspond with this one from the agouti. It is preserved in the Museum of the College of Surgeons among others of similar nature.

Fleming, in an article in the "Veterinarian," Vol. XIX, 1873, describes a case in which it became necessary to remove a large excrescence from an elephant's molar, which had grown into the brute's cheek and almost prevented his feeding. A mahout removed it in the following manner. He obtained a thick log of wood and made a hole through it large enough for his arm to pass. Outside he covered it with nails, leaving about a quarter of an inch sticking out of the wood. The elephant was made to lie down, and was fastened with hobbles, while the log thus prepared was placed in his mouth like a bit, and bound with ropes across his neck. Twenty or thirty persons now sat upon his head and trunk (if these be kept down an elephant cannot rise from his side), and the operator introduced his arm through the hole and began to saw off the protuberance. He took several hours to effect it, the elephant all the while lying perfectly still, with the expression of a martyr in his upturned eye. The piece sawn off was as large as one's fist, and the animal soon got perfectly well.

This is perhaps the best place to notice *pyorrhœa*



*alveolaris*, a disease which gives rise to the *absorption* of the alveolar borders of the jaws as the result of irritation from tartar on the teeth.

The following case came under my observation, which is not only a typical example of the disease, and important in its bearing on the pernicious effects of tartar deposited on the teeth, but in the fact that the disturbance thus set up was indirectly the cause of the animal's death. The subject of this observation was a monkey, *Cercopithecus lalandii*, which had lived for some time in the Zoological Gardens.

On examining this monkey *post mortem*, the lungs were found to present patches of septic pneumonia; some of the affected spots were bordering on gangrene. Along the free borders of the middle lobes large tracts of collapsed lung tissue presented themselves. On opening the trachea and bronchi pus was found in many places.

On examining the mouth the source of this mischief was at once evident, for on the right side the molar and premolar teeth of the upper jaw were found encrusted with large rugged and nodular masses of tartar. The alveolar margins of the jaws were absorbed, and the fangs of the teeth were exposed for the greater part of their length as shown in Fig. 10. The left side was not so much affected. The buccal mucous membrane

was in a condition of ulceration, and the teeth were bathed with pus; there can be little doubt

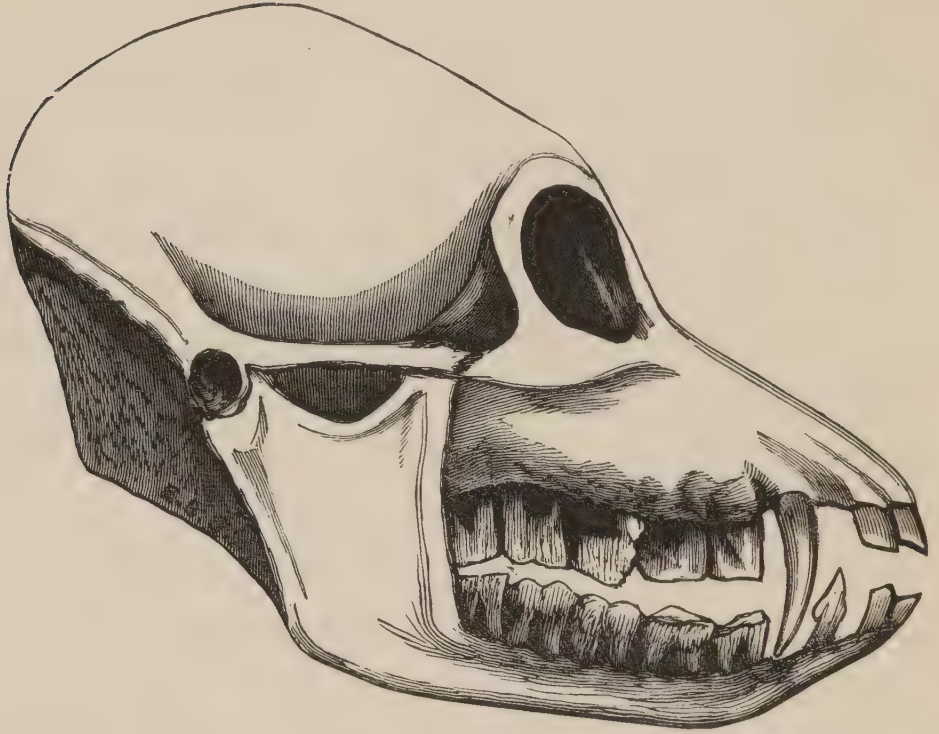


FIG. 10.—Skull of a monkey, *Cercopithecus lalandii*, showing marked absorption of the maxillæ, especially the inferior one, in consequence of deposits of tartar.

that the purulent discharges were inspired and passed into the air passages, setting up pneumonia of a septic character, ending fatally.

The skeleton of the monkey was in other respects normal; not the least evidence of rickets could be detected, so that the affection was purely a local one.

Fig. 10 represents the right side of the skull of *Cercopithecus lalandii*, and is particularly intended to show the amount of absorption of the alveoli that has taken place.

## ATROPHY.

Atrophy of the maxillæ arises from two distinct causes: 1st, as a consequence of fall of the teeth; 2nd, the result of constitutional bone disease.

So far as man is concerned, fall of the teeth and atrophy of the jaws is regarded as one of the inevitable consequences of old age, as is wrinkled skin, white hair, or senile cataract. Such conditions of the jaws in animals come under observations very rarely. The teeth of animals are of so much value to them, not merely in cutting and grinding their food, but in the more important matter of seizing and retaining it; indeed, the existence of many animals may be said to depend on the integrity and effectiveness of their dental armature. If disease attacks the teeth of an animal in its wild state the creature fails to gain a proper supply of nourishment, pines and dies, or, more probably, falls a prey to some rival with stronger jaws and teeth.

The most characteristic example of this rare form of atrophy that has come under my observation was in a kangaroo, whose skull is represented below, Fig. 11. The appearance is quite characteristic of the same condition seen in man, and needs no description.

From some unknown reason kangaroos are



extremely liable to dental troubles of all kinds—caries, deposits of tartar, pyorrhœa alveolaris, inflamed pulp, alveolar abscess, inflammatory thickenings, and necrosis of the jaws.



FIG. 11.—Skull of a kangaroo to show atrophy of the jaws in consequence of premature fall of the teeth.

In 1847 there died on Lewes racecourse a female ass, aged eighty-five years. She was familiarly known in Brighton as Gipsy Lee. The last owner possessed her thirty years, and he stated that the man from whom he purchased the animal used her thirty-five years. She had no teeth at last, and was obliged to be nursed.

A Himalayan bear died recently after living for fifteen years in the Zoological Gardens. It is interesting to note that the only sound tooth in the mouth are the canines; both the alveoli and the roots of the teeth seem to have undergone absorption. The majority of the teeth that remain are attached to the gums by fibrous tissue, and

present in some instances a polypus-like appearance.

The second form of atrophy, that from constitutional bone disease, I do not propose to consider at great length, as this was detailed so recently before this Society in my last communication. It will be sufficient to state that atrophy of the jaws, leading to a premature fall of the teeth, is liable to occur in the course of such diseases as mollities ossium, &c., and has been observed not only in man, but in monkeys, lemurs, carnivorous mammals, opossums, kangaroos, lizards, and snakes living in confinement.

#### HYPEROSTOSIS.

About 1745 or 1750 a skull was dug up from a depth of 15 feet in the soil at the village of Sacy, near Rheims. This skull was presented by a physician of that town to Bernard de Jussieu. In 1799 Jadelot published an account of the specimen, which was remarkable for its great volume, and from the circumstance that the nerve foramina were almost obliterated.

The skull has been examined and carefully re-described by Paul Gervais in the "*Journal de Zoologie*," 1875.

The most important features in the skull are these:—

The dentition clearly shows it to have belonged

to a child, aged about five years. All the bones of the cranium and face have acquired an extraordinary thickness; some of the sutures have suffered obliteration, and the zygomatic arch is enormously thickened.

The nasal orifice is much contracted by bony overgrowth; the posterior nares, antra, and orbits

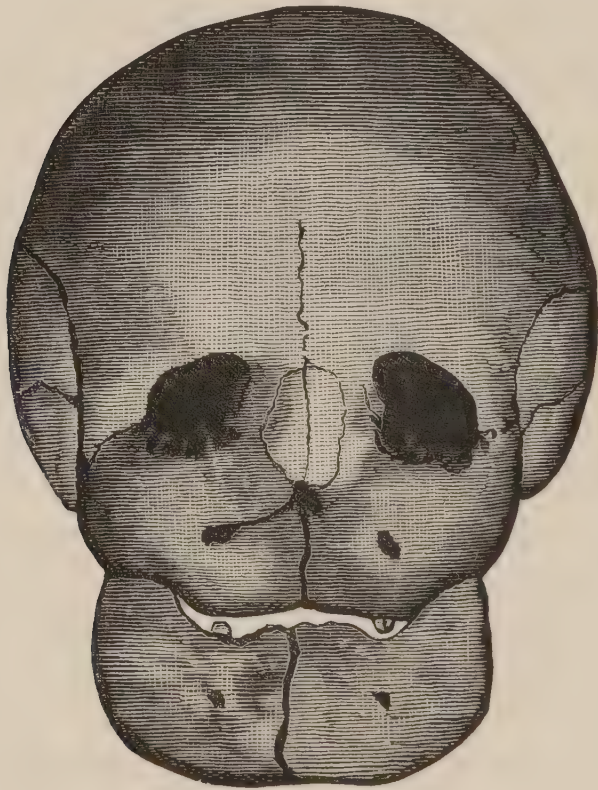


FIG. 12.—Hyperostosis affecting the skull of a child. Dug up at the village of Sacy, near Rheims, about 1745 (after Gervais).

present a similar condition. The lachrymal canal, infra-orbital foramina, and the sphenoidal fissure are almost closed, and the nerve-foramina in the



basis cranii have become almost obliterated. The foramen magnum is narrowed, the crista galli and clinoid processes are thick, whilst the foramina in the cribriform plate are not obvious. The nutrient foramina are larger and more numerous than usual.

The walls of the skull vary from an inch to an inch and a quarter in thickness. The maxillæ are very thick, and the alveolar ridges greatly hyperostosed. A detailed account of this remarkable case has been given, for it is a typical example of hyperostosis (Fig. 12).

Gervais, in his account of this case, gives reference to numerous cases similar in character recorded by Malpighi, Bojanus, Vrolik, Kilian, and Huschke; the Musée Dupuytren contains some examples; also the Museum of the College of Surgeons, London.

There is one peculiar feature about these skulls which is of some importance, namely, that in the recent state they were in all probability soft, and in the dry state the general thickening and porous condition of the bones will serve as a ready means of distinguishing them from the terrible diseases known as Leontiasis ossea, so named by Virchow. Cases precisely similar to the Sacy skull I have twice seen in monkeys, in whom the hyperostosis of the alveolar ridges was very marked. A third case was reported to

me in a living monkey, in whom the distortion was so remarkable that the dealer wanted an absurd sum for the animal, thinking it to be a new species!

The most marked of all the examples of this disease is the one on the table. It is the skull of a sea-lion, *Otaria jubata*, from the Falkland Islands. The specimen is the property of Mr. C. Bartlett, to whom I am indebted for the opportunity of describing it.

The specimen evidently belonged to an adult animal, for all the principal sutures have disappeared.

The first features which attract attention on examining the skull are the extremely porous condition of the bones, and the diminished weight notwithstanding the increased thickness of the skull bones generally.

It measures from the foramen magnum to the most anterior limit of the premaxillæ 15 inches. Across the base from one zygoma to the other 10 inches. The width of the palate is 5 inches, each alveolar ridge measuring  $1\frac{1}{2}$  inches.

On looking at the alveolar ridges it will at once become obvious that there is very considerable hyperostosis, and that many of the teeth sockets are exceedingly shallow. The only teeth present in the skull are one lower canine and two premolars in the upper jaw. This makes the hyper-

ostosis the more remarkable, for as a rule when the teeth fall the alveolar ridges become absorbed, hence the condition of this specimen leads one to suppose that the hyperostosed condition of the alveolus played some part in causing the premature fall of the teeth.

The thickened porous condition of this skull and its general characters declare it to be an example of hyperostosis similar to that seen in the skulls of rickety animals about puberty. It is very interesting in this particular case, for this animal had never lived in captivity.

This specimen induced me to learn what I could concerning other specimens of the skulls of Otaridæ. I found a skull in the Museum of the College of Surgeons which had belonged to an old male with a localised hyperostosis of the lower jaw about the symphysis, but in this specimen there was evidence to lead one to suspect that it was the result of accident. The curious condition of the first skull sheds some important light on a pathological condition of the teeth, which at first sight is not apparent.

In the Museum of the Middlesex Hospital there is a skull which I removed from the raccoon-like dog, *Nyctereutes procyonides*, which, in common with the rest of its skeleton, was afflicted with a disease having all the characters of mollities ossium. In this specimen the teeth had under-



gone that peculiar change known as erosion, and many of them had fallen out, the sockets being in part obliterated by overgrowth of bone, porous in character.

Before proceeding to sum up the evidence on these cases, it is necessary to take into consideration the teeth of another interesting animal from the Falkland Islands, the elephant seal, *Macrorhinus leoninus*, which often attains astonishing proportions. At one time these creatures were frequent on the islands, but now they are very rare. The teeth have been very carefully described and figured by Professor Flower, in the "Proceedings of the Zoological Society," 1881; the following is taken from his description:—

Leaving out of consideration the exceedingly aberrant and specialised walrus, the teeth of the elephant seal are more reduced in number, size, and form than those of any other Pinnipedia, the only other member of the group which agrees with it in most of these characteristics being the closely allied *Cystophora* of the northern seas.

The dentition when complete is

$$i \frac{2}{3}. \quad c \frac{1}{1}. \quad p.m. \frac{4}{4}. \quad m \frac{1}{1}$$

though it frequently happens that one or more of the true molars, especially those of the upper jaw, are rudimentary or wanting. All the teeth, even the canines, are remarkable for their comparatively small enamel-covered crowns, and for the

large size of their simple roots, which continue to grow in width as well as length during the adolescence of the animal, and are further enlarged in thickness by the addition of a considerable layer of cementum to their outer surface. In this character the teeth resemble those of many of the Odontocetes, so much so that in the case of isolated fossil teeth of the crag formation, it is



FIG. 13.—An outline sketch of the teeth of the elephant seal, *Macrorhinus leoninus*, to show the peculiar carrot-like tops of their molar teeth, probably the result of erosion (modified from Flower).

often very difficult, if not impossible, to say whether they come from the Cetaceans or the Seals. Although other Pinnipeds show this peculiarity, it is carried to its greatest extent in the elephant seal. The very small size of all the teeth

except the canines, and more especially those of the molar series, in proportion to the great magnitude of the animal, is very striking. They must, in fact, be almost functionless. The molars are reduced to the extreme of simplicity. Each has a single long, tapering root, shaped something like a carrot, having a thickened shoulder near the neck, caused by the deposition of cementum, and which projects above the alveolus in old animals (Fig. 13).

The crowns when young present traces only of the divisions into pointed cusps or lobes, so characteristic of the molars of most seals—mere grooves upon the surface becoming deeper towards the apex, to which they converge, and marking off rudimentary cusps, more distinct on the outer than the inner surface of the tooth. The fifth molar in both upper and lower jaws is of more simple character than the others, often only a simple cone.

Mr. Tomes, in his "System of Dental Surgery," considers that a slight degree of erosion among seals is very common, and refers to a specimen of *Otaria stelleri* in the Museum of the College of Surgeons, which exhibits a well-marked eroded condition.

It seems to me that the curious ridged appearance often seen in the small functionless teeth of the walrus is to be regarded as a species of erosion.



In the cases just considered there are two things to bear in mind—the association of erosion with constitutional bone disease, and with functionless, and therefore imperfectly developed teeth. Serious disease during dentition often leads to ill-formed teeth, hence one circumstance asserts itself most in connection with erosion of the teeth in animals, viz., defective development. Whether constitutional disease and imperfect development can be regarded as causes of erosion occurring in human subjects, I must leave to those more intimately acquainted with their teeth than myself, but it seems a very probable explanation.

### TUMOURS, &c.

New formations of any description in connection with the jaws of animals are exceedingly uncommon, and very few cases are recorded in the literature of tumours.\*

In the present paper the known varieties of the morbid growths found in this situation may be arranged as follows:—

- (a) Cystic tumours.
- (b) Exostoses.
- (c) Sarcomata.
- (d) Actinomycosis.

\* I exclude from the term tumour the infectious granulomata, glanders, farcy, and the like.

*Cystic Tumours—Dentigerous Cysts.*

The term “dentigerous cyst” is restricted to those cystic formations met with in the maxillary bones associated with misplaced, or imperfectly developed teeth.

It is an important point to exclude from this category those teeth-bearing cysts which occur with especial frequency in the head, particularly in the immediate neighbourhood of the temporal bone, in relation with the petrous portion. These strictly come under the definition of Dermoid Cysts.

In an interesting paper published in the *Gazetta Medico-Veterinaria* of Milan by Professors L. Buonsanti and Generali, translated in the “*Veterinarian*,” Vol. XX, by Fleming, and entitled “Dental Cysts,” an admirable account of these formations is given, from which it may readily be perceived that those cases of aberrant teeth occurring with tolerable frequency in horses and oxen in the temporal, petrous, and sphenoidal regions of the skull base are really dermoid, and the term “dentigerous” ought not to be applied to them. Nevertheless, true dentigerous cysts do occur in animals, and one or two of the examples mentioned in the paper quoted above were undoubtedly of this nature.

Salter has described an indubitable instance of

“dentigerous” cyst in the superior maxilla of a young sheep. The specimen was in the Museum of St. Bartholomew’s Hospital. In this case the central incisor is attached to the side of a large cyst, the fang of the tooth being almost destitute of bony covering. The Museum of the College of Surgeons, London, possesses a specimen of dentigerous cyst formed round the retained first incisor in the lower jaw of a pig. An incisor tooth is wanting externally on each side. On the right side the crown of the retained tooth is firmly fixed in the bony wall of a cyst which has a membranous lining and was filled with caseous pus and fragments of food. The latter had obtained entrance by an opening in the alveolar process, situated near the middle line. A cyst on the left side is partially laid open, and its contents, similar to those which filled the right cyst, are exposed to view (Museum Catalogue).

True dentigerous cysts have been observed in the horse, sheep, and pig, but as in man they are extremely uncommon.

The Museum of the Odontological Society of Great Britain contains a specimen illustrating a dentigerous cyst in the lower jaw of a lamb. There is also a second specimen apparently of the same nature, illustrating the occurrence of a similar cyst in the lower jaw of a sheep, near the symphysis.



Sir James Paget, in his Lectures on Surgical Pathology, refers to a case of Professor Baum, where a woman had one of these cysts in each antrum, which had been in progress for thirty years: a canine tooth was removed from one cyst and a molar from the other.

A curious example has come under my own notice in a goat, which for the deformity it produced certainly equals this very remarkable case of Baum's, and excels it in the number of cysts. Each antrum was occupied by a cyst, and each lower jaw contained one near its angle.

In all parts of the skull the bone was so soft that it could be cut easily with a knife, but the bodies of the superior maxillæ were almost as thin as ordinary writing paper.

On making a longitudinal cut through the skull so as to pass through the antrum, its interior was found to contain a thick-walled cyst with what appeared to be the first permanent molar in its centre. The condition of the parts is well shown in Fig. 14*a*. The superior maxillary division of the fifth nerve is seen coursing over the summit of the cyst.

There can be little doubt that the parietes of this tooth-containing cavity are really the walls of the tooth follicle enormously thickened, for on making sections of the part it is found to be made of connective tissue undergoing ossification. The

structural details of the walls are given in Fig. 14*b*, and this accords with the structure of the tooth follicle of a healthy ruminant compared with it.



FIG. 14*a*.— A section through the antrum of a young goat showing a thick-walled cyst containing a molar tooth. S.M.N. Sup. max., branch of fifth nerve spreading over the cyst.

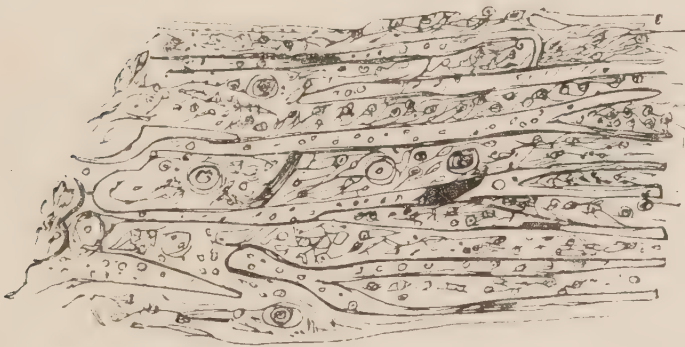


FIG. 14*b*.—Microscopic appearance of the cyst wall showing trabeculae of osseous matter in connective tissue.

In the lower jaws the case is not quite so evident. Two spongy masses with a small internal cavity, filled with a pulpy-looking material,

occupy the body of the bone near the ramus, but on the most careful examination no trace of a tooth could be discovered in the spongy mass, either on the right side or the left: nevertheless, the morbid masses occupied the situation of teeth, and corresponded in structure with the cysts in the upper jaw. There can be little reasonable doubt that they have the same origin, viz., from the abnormal growth of tooth follicles.

About a month after the discovery of this goat's skull, I was able, through the courtesy of Mr. Shave, at the Royal Veterinary College, to examine the skull of a goat a year old, which had been sent to that institution. There was a large swelling at the angle of each lower jaw, which on section was found to result from a soft mass of spongy tissue which had grown in the situation of one of the molar teeth. Under the microscope this tissue exhibited all the characters of the cyst wall in the upper jaw of the goat first described, but as in that case the most careful search failed to reveal a tooth; yet there can be little doubt that these were of the same nature as those in my goat, and that the growth of the tooth had been suppressed in an early stage.

These two cases shed light on a tumour connected with the jaw of a goat described by Virchow in his "Cellular Pathology," chapter xix, as a soft osteoma. The tumour affected the



superior and inferior maxillæ, but each separately ; it had such little density that it could be cut with a knife. On comparing Virchow's account and the figure of the histological details of this tumour, I am convinced that it was of the nature of the growths just described, and was really a cyst of the same nature as in the other goats.

These tumours have other interesting features, for they show, as Virchow very graphically pointed out in his specimens, "the transitions from connective tissue into osteoid tissue. The trabecular spaces formed of spongy bone containing delicate connective tissue is very striking, exactly recalling the condition seen beneath the periosteum in a long bone severely affected with rickets." The bands of fibres run parallel with the osseous trabeculæ, and dotted here and there large rounded concentric masses of earthy matter can easily be distinguished.

These cases are also interesting, for they serve to explain why the walls of dentigerous cysts are sometimes made up of soft tissue, and at others have bony walls. In the case of the first goat the walls of the follicle were soft because its development had not yet reached the stage at which calcification should occur ; had this animal lived there can be little doubt that in course of time this wall would have become ossified and the tooth have been surrounded by a bony capsule such as we

know occurs in some cysts of this kind met with in the human subject.

The tumours in the goat's jaw have yet another interest. It has long been known that herbivorous animals, especially the horse, are liable to odontomes in connection with the molar teeth. These tooth tumours are composed almost entirely of cementum.

The most careful description of an odontome of this kind is contained in the Transactions of this Society for 1871-2. Mr. Chas. Tomes gives a careful account of the histological structure of one from the molar teeth of a horse, weighing ten ounces.

The mass is composed almost entirely of cementum which in its outer portion is arranged in concentric layers. Inside the laminated portion the mass consisted principally of osteo-dentine. On carefully going into the details of other examples of cementomata occurring in animals, I have come to the conclusion that the alveolar-dental periosteum is responsible for these masses, and that if the goats in whom the above described tumours were found had lived longer, we should have found odontomes instead of soft tumours, and that in these cases we have really to do with a very early stage of these curious tumours, and it affords certainly a more satisfactory explanation of their origin than the invocation of a hypothetical cement organ.

It is necessary to distinguish between teeth found in dentigerous cysts and teeth retained in the jaws. All teeth which are developed, but not erupted, do not give rise to these cysts. Nevertheless they may at times occasion troubles almost as difficult to deal with. The very good collection of animals' skulls illustrating dental diseases contained in the Museum of the Royal Veterinary College, London, possesses specimens which illustrate the truth of this statement.

In one characteristic example, the skull of a horse, one of the temporary molars may be seen in the upper jaw retaining its position, though thoroughly carious, with the permanent set. During life the animal suffered from a profuse nasal discharge, which resisted treatment, and as the fœtor arising from the condition was intolerable, the horse was killed. On dissecting away the outer wall of the antrum, the permanent molar was found in close contiguity to the antrum. A large fistula existed between the carious tooth and the nasal fossa. An exactly similar condition was found on the two sides.

#### *Exostoses.*

The Museum of the College of Surgeons contains among its treasures the superior maxilla of a codfish with a large disk-shaped osseous tumour growing from it. The growth measures two inches in



transverse diameter, and half an inch in thickness, and is made up of hard compact bone. (Fig. 15.)

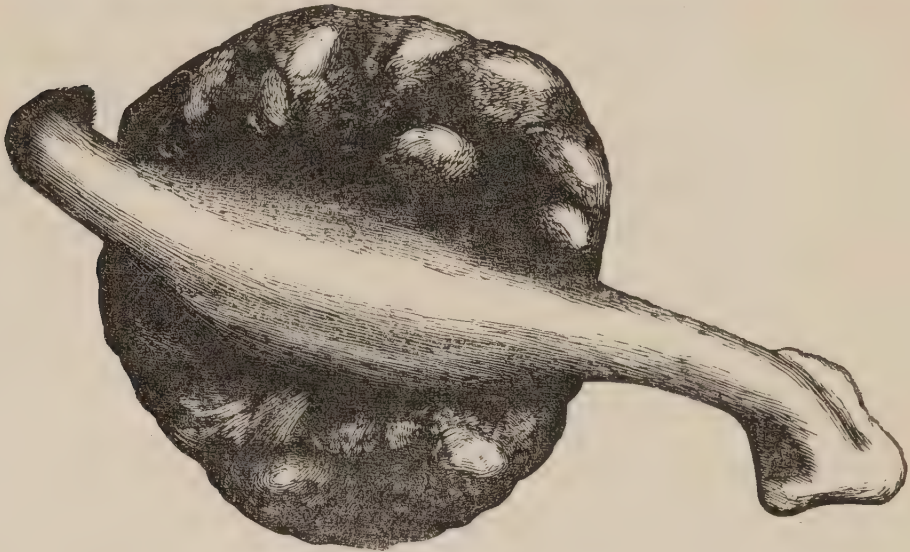


FIG. 15.—Superior maxilla of a codfish, *Gadus morrhua*, with a compact exostosis growing from it. (Museum of the College of Surgeons.)

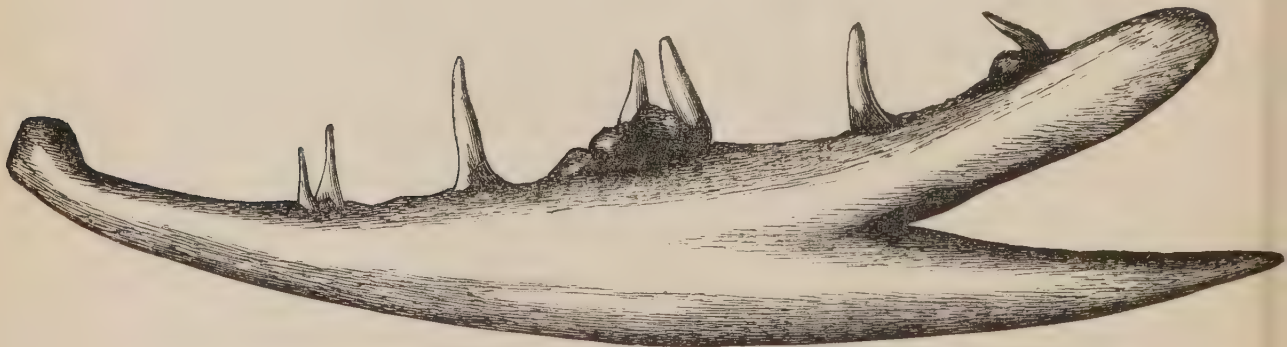


FIG. 16.—Dentary bone of a pike, *Esox lucius*, with a spiculated exostosis growing upon it.

The same collection also contains the dentary bone of a Pike with an exostosis attached to it, which has displaced two of the teeth inwards. The growth, which is finely spiculated, springs from the margin where the teeth are attached.

It seems that the jaws are favourite seats of exostoses in animals as in man. There are several cases recorded in horses. In one case a tumour weighed twenty-one ounces, and grew by a narrow peduncle from the septum nasi, but the mass of the growth was lodged in the antrum.

In another well-recorded case an exostosis growing from the premaxilla of a horse, displacing the incisor teeth, was safely removed from a three-year-old colt. It weighed five ounces. In both these cases the growth exhibited under the microscope the structure characteristic of true bone.

The occurrence of cartilage tumours and exostoses in connection with the bones, and especially with the maxillæ, are facts of very considerable interest, for there are many cases recorded in man and in animals. The embryological history of the face affords a very satisfactory explanation as to their probable origin.

In 1875 Virchow showed that in the bones, islands of cartilage which remain untransformed in the general ossifying process may later in life become the starting point for the formation of cartilage tumours. It may also be conceded that the "islands" may also be the starting point for osteomata, as these tumours are but a further development of cartilage; growing exostoses are always covered with a cap of cartilage.

The conception may easily be applied to the

jaws. If at the tenth week of intra-uterine life the investing tissues of the face be carefully teased away, or better still if the parts be divided by a series of vertical sections carried through the skull and examined in detail with a lens, it will be observed that a pent-house shaped piece of cartilage passes from the trabecular region of the skull and terminates at the tip of the nose. This layer of cartilage is known as the fronto-nasal plate, and it is supported by the median ethmo-vomerine plate. The general arrangement is shown in Fig. 17, A, B, C, and in section at D, where the disposition of the cartilage is better shown. These figures will serve to show the chondrified condition of the face in all mammals. As development proceeds, the nasal, palate, and superior maxillary bones develop in the perichondrium, and by their pressure cause atrophy of the underlying cartilage. The ethmo and inferior turbinals develop in the scroll-like pieces of cartilages. The only part of the fronto-nasal plate left in its original cartilaginous condition in the adult is that which forms the lateral and sesamoid cartilages of the nose. The vomer arises in the perichondrium of the ethmo-vomerine, and by its pressure causes the adjacent cartilage to disappear; bone is deposited in the upper portion to form the perpendicular plate of the ethmoid with the crista galli, whilst the extreme end maintains its original



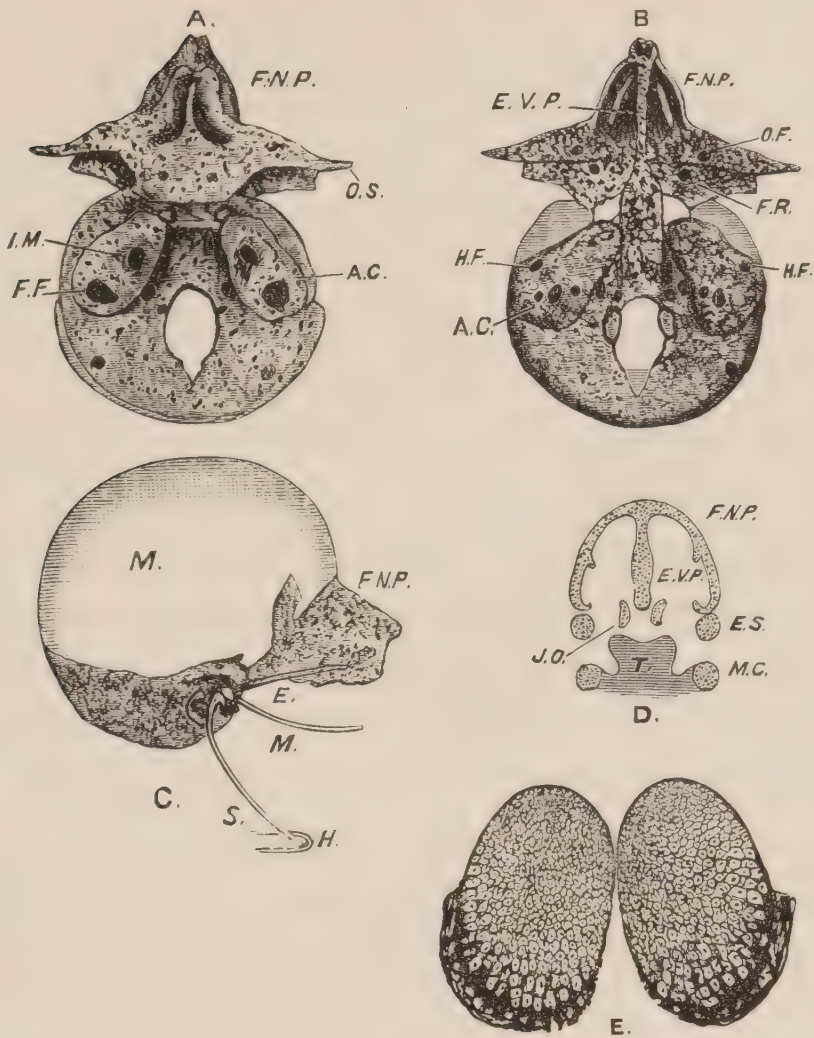


FIG. 17.—Four views of the human skull in its cartilaginous condition. The remnants of this cartilage may in later life become the starting point of enchondromata and osteomata.

A., The same viewed from above.

F.N.P., fronto-nasal plate.

O.S., Orbito-sphenoid.

A.C., Auditory capsules.

B., The same skull viewed from below.

C., Side view. F.N.P., Fronto-nasal plate.

E., Eustachian cartilage.

M., Meckel's cartilage.

S., Styloid cartilage.

D., Section through the facial region of the same skull.

E., The tip of Meckel's cartilage preparing for ossification.

condition, and is recognised in the adult as the triangular cartilage of the nose. Two little plough-share-shaped pieces of cartilage are also retained on either side of this septum, immediately over the anterior palatine canals, to support the structure known as the "organ of Jacobson."

Seeing then that cartilage enters so largely into the formation of the face,—persists in places even throughout life,—we have not far to seek for "cartilage islands," which may germinate under favourable conditions into cartilage or osseous tumours.

In the lower jaw, that portion of the bone anterior to the mental foramen is developed in Meckel's cartilage. Patches of cartilage are also very frequent at the angle of the maxillæ.

It is a curious but significant fact, that of all parts of the jaw the symphysial region and the angle are by far the most frequent seats of enchondromata and osseous tumours.

*Sarcomata*.—It is necessary to observe great caution in drawing conclusions as to whether sarcomatous tumours recorded as growing from the jaws of animals are really of this nature. Very many tumours said to be sarcomata, or osteo-sarcomata, were no doubt in the majority of cases really examples of actinomycosis, a disease tolerably frequent in horses and cattle.

There are some cases, however, which do not admit of any doubt.

The "Veterinarian," 4th series, Vol. XXIII, contains a well-recorded case springing from the nasal surface of the superior maxilla of a horse. Microscopically it was found to be composed of small round cells, with a few spindle-shaped cells intermixed.

Mr. Lediard has recorded, in Pathological Society's Transactions, Vol. XXXV, a case of sarcoma affecting the lower jaws of a horse. The maxillæ near the symphysis on both sides are hollowed out into a large cavity, the walls of which are very thin, and the teeth displaced.

### *Actinomycosis.*

Bollinger, of Munich, was the first to draw serious attention, in 1877, to this remarkable disease as met with in cattle, and Dr. Jas. Israel, of Berlin, noted its occurrence in man in the following year, 1878. But an Italian, Rivolta, had previously published a description of it as "fibrous sarcoma," in *Il Medico Veterinaria*, Turin, 1868. There is no doubt that the affections previously described by veterinarians as wooden tongue, spina ventosa, tubercular stomatitis, scirrhus tongue, osteo-sarcoma, &c., were in the majority of cases actinomycosis.

This disease may be defined as an inflammatory affection occurring in man, cattle, and swine, and characterised by the formation of nodules composed



of cells surrounded by fibrous tissue, accompanied by suppuration set up by a certain fungus known as the actinomyces, or "ray" fungus.

The disease is especially frequent in cattle, and consists of small nodules which appear on the upper or lower jaw, the tongue, pharynx, œsophagus, intestines, skin, or even in the lungs.

It is especially frequent in the jaws, and invades bone, muscle, mucous membrane, or skin.

When the disease attacks a bone the growth has the appearance of a sarcomatous tumour. It often commences in the alveoli, extending thence into the mouth, and spreads through the cancellated texture of the bone, giving rise to abscesses and fistulæ.

There can be little doubt that the numerous reported cases of sarcomata occurring in the jaws of cattle are really, in the majority of instances, examples of actinomycosis.

The bones in these cases, when macerated and dried, present the curious hollow expanded condition which used to be familiar to surgeons as spina ventosa, and present the same characteristic spongy condition, resembling pumice-stone.

*The Actinomyces.*—The true botanical position of the fungus has not been determined. When one of the soft yellow-coloured globular tufts is examined under the microscope with a low power it presents a radiate arrangement. When properly prepared, as by staining with Spiller's purple and

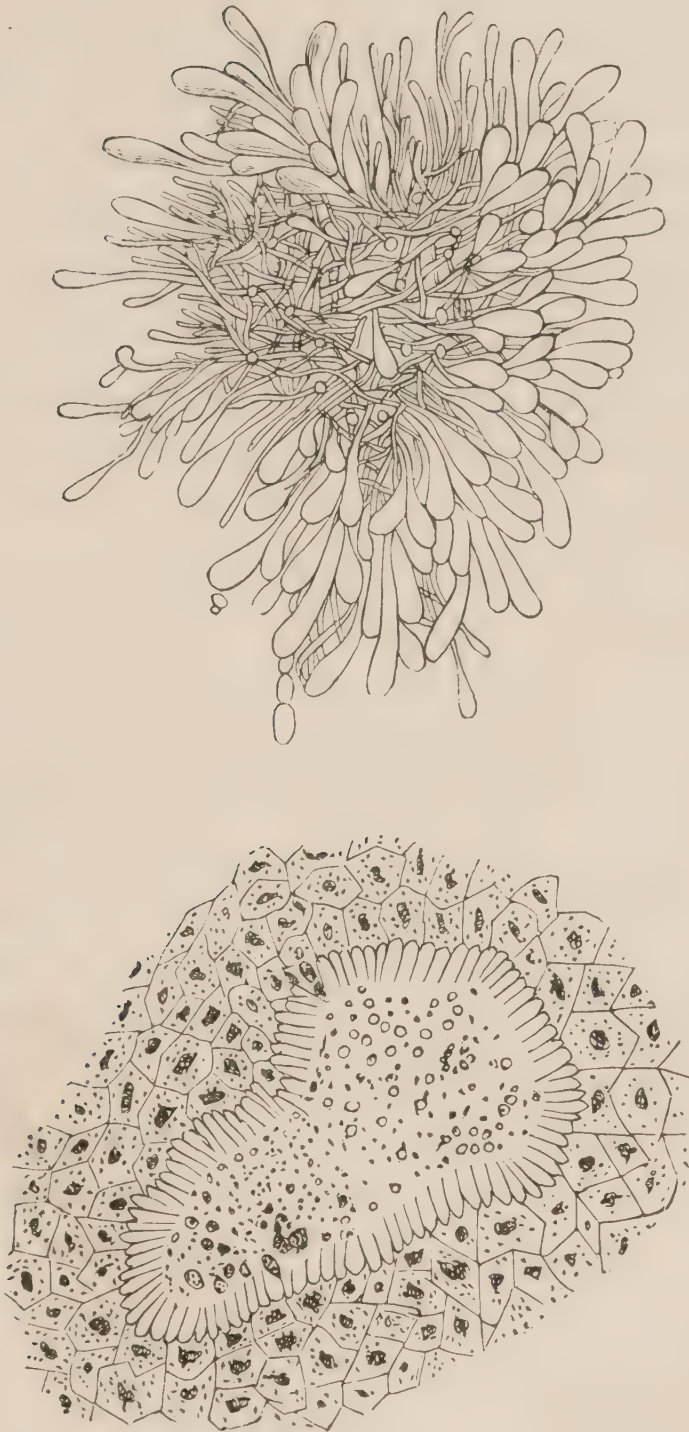


FIG. 18.—Tufts of Actinomycetes highly magnified (after Fleming).

examined under a high power, they will be found composed of a kind of capsule of fibrous-looking tissue, having inside this a collection of cells looking something like lymphoid cells; approaching the centre the cells get larger, and occupying the middle of the mass is the cluster of actinomycetes, presenting an appearance described by Ziegler as that of a "tufted rosette of radiating pyriform or club-shaped structures." These club-shaped structures are regarded as the conidia of the fungus.

When fully developed the tuft has an appearance resembling that of a mulberry (Fig. 18). The centre is regarded by some as a mycelium, and the radiating tufts as the conidia.

When the fungus settles in a tissue it gives rise to inflammation, and while the spore is developing its mycelium an inflammatory nodule forms around and has very much the look of a tubercle. Recent nodules contain round cells, older ones giant cells, and old nodules are often calcified.

Small nodules may become confluent and give rise to a tumour of the size of an orange, but their tendency is to break down and suppurate. Hence large masses always contain pus cavities and are riddled with fistulæ.

*Ætiology.*—We are not in possession of satisfactory evidence as to the way in which the actinomyces gains entrance to the tissues. In all probability it enters in the form of spores through



wounds, or abrasions of the buccal cavity, such as those left after the extraction of teeth. The fungus has been discovered in the lachrymal sac, and in the cavities of carious teeth.

If the disease does not affect any important organ, and is in a situation where it can be completely removed, recovery may follow ; but if treatment be neglected, the disease extends, involves internal organs, and ends fatally. In animals it is nearly always a fatal disease.

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## DISCUSSION.

The PRESIDENT remarked that the applause which had followed the reading of the paper showed how much it had been appreciated. It was certainly a most interesting paper, and one that offered plenty of subjects for discussion. He remembered reading some years ago in Gordon Cumming's book on Lion-Hunting in South Africa an incident which went to confirm Mr. Sutton's statement that wild animals did not escape disease. The author related how he shot a lion which proved to be in very poor condition, and found that it was suffering from an abscess at the root of one of the canines.

He noticed that Mr. Sutton in the course of his paper spoke of Riggs' Disease as being due to the irritation of tartar deposited on the teeth. Now his experience was that cases of Riggs' Disease were met with in which there was no deposit of tartar, and that on the other hand there might be a large quantity of tartar present and yet no Riggs' Disease. He had certainly met with cases in which extensive wasting of the alveoli had taken place, and the teeth had fallen out, but in which there was no tartar to be seen. He should be glad to hear the opinion of others on this point.

MR. STORER BENNETT said he had been much interested in what Mr. Sutton had said about the "cartilage islands" and their connection with the growth of exostoses. It was undoubtedly a most remarkable fact that the parts of the jaw which were most liable to be the seat of exostoses, viz., the symphysis and the angle, should be those which remained united by cartilage until a comparatively late period, and that the same held good with regard to the temporal bone. He was not quite clear whether Mr. Sutton said he had actually observed the transition from soft tissue to bone, or whether he had only inferred it. For, unless it had been



actually seen, he was very doubtful whether there was such a transformation as would convert a dentigerous cyst into an odontome.

MR. HENRI WEISS said that as the thickening of the bones of the skull, to which Mr. Sutton had referred as osteoporosis, was not a common disease in man, it might be of interest to mention that he had met with a case at the National Dental Hospital which appeared to be of this nature. The patient was a girl of from eighteen to twenty years of age. She had noticed that her teeth were separating for some few months past; previously they had been close together, now they were nearly an eighth of an inch apart. There was bony thickening round the teeth, resembling hypertrophied gum, but which was found to be bone covered with the usual thickness of gum. The supra-orbital and temporal ridges were markedly enlarged; there was also enlargement of the bone about the symphysis and angle of the lower jaw. The patient only applied to know if anything could be done to arrest the changes that were going on, and was not seen again.

MR. CANTON asked whether Mr. Sutton had found exostoses on the lower jaw of animals most common on the outer or inner plate? He had mentioned the neighbourhood of the symphysis and of the angle as the most common seats of exostoses of this bone, and had accounted for this by the fact that remnants of foetal cartilage were apt to persist in these situations. He (Mr. Canton) had lately had a case in which a considerable exostosis had formed on the inner plate in the bicuspid region, anterior to the angle. How did Mr. Sutton explain the appearance of an exostosis in this situation? He had been much interested in what Mr. Sutton had said about the occurrence of erosion of the teeth in animals. It was quite clear that if animals were thus subject to erosion, it could not be due to the use of the tooth-brush, as had been suggested.

MR. D. HEPBURN said he could fully confirm Mr. Sutton's statement as to the frequency with which exostoses were met with in the neighbourhood of the symphysis; they were

really very common, though as they did not cause the patient any pain or trouble, and nothing could be done in the way of treatment, it was not often that the practitioner made any note of their existence.

He thought that tartar was more often the result than the cause of disease. As soon as a tooth ceased to be used freely it was apt to become the seat of a deposit of tartar. He had noticed this particularly in the case of a tame monkey which used to suffer occasionally from inflammation of the gums. The teeth got loose and tender, the animal could not bite freely, and a deposit of tartar quickly took place. But as soon as the inflammation subsided, the tartar, which had not had time to get very hard, was soon removed by the friction of mastication.

MR. R. H. WOODHOUSE said he had been surprised to hear Mr. Sutton's statements as to the frequency of disease of the teeth and jaws in wild animals; he thought, however, that it was going rather far to say that the opinion "that disease of the jaws was due to civilization was all nonsense." Did not Mr. Sutton think that animals kept in captivity suffered more from these diseases than they did in their natural state? He thought that as regards man, at all events, it had been conclusively proved that the quality of the teeth was immensely influenced by the general conditions of life.

MR. HUTCHINSON said reference had been made to the fact that teeth might be lost from Riggs' Disease without there being any appearance of tartar. He thought that this might be partly explained by a fact which was mentioned by Mr. Tomes in his book, but which was, he believed, generally overlooked, viz., that the more highly calcified a tooth was, the less hold it had on the alveolus. Mr. Tomes mentioned this as accounting for the loss of sound teeth in elderly subjects, and it might also explain the fact that some people lost their teeth from apparently much slighter causes than others. The loss of the teeth in animals might also be sometimes thus accounted for. Had Mr. Sutton formed an opinion as to whether exostoses were more common on the upper or the

lower jaw? He (Mr. Hutchinson) had found that their most common seat in the upper jaw was the ridge over the second molar, but that they were not met with so frequently on the upper as the lower jaw.

He had followed Mr. Sutton's remarks with reference to erosion very attentively, but was sorry to say he could not quite understand how he accounted for it.

MR. F. N. PEDLEY said the odontome composed of cementum shown by Mr. Sutton did not resemble those described in the writings of Mr. Tomes, to which Mr. Sutton had alluded. Odontomes connected with human teeth were mere hypertrophies of dental pulp which had undergone irregular calcification. The specimen shown bore some resemblance to an *odontome radicaire*, but the latter was chiefly composed of osteo-dentine formed by the calcification of an hypertrophied pulp, and could not strictly be described as a tumour, for it was not a new formation or heterogeneous in structure to the tissue in which it grew. Mr. Sutton's odontome, on the other hand, consisted of cementum, and must either be regarded as an exostosis formed from the peridental membrane or as a true tumour of the tooth.

Mr. Sutton had also alluded to a developing odontome in which no tooth was present. This resembled the class *odontome embryoplastique* of Broca; but there was some doubt in the minds of many surgeons whether these fibro-cellular masses were odontomes at all, or whether they were analogous to the encysted fibroids found in the uterus and elsewhere.

Mr. Sutton's explanation of erosion as being due to developmental defects was scarcely consistent with the fact that it so frequently occurred in strong well-formed teeth; nor would it account for the formation of smooth polished surfaces in erosion and of cavities that had been the seat of caries.

The appearances presented by the skull of the sea-lion, due to hypertrophy accompanied by osteoporosis were strongly suggestive of Sir James Paget's new disease, Osteitis Deformans, and might be described as *Leontiasis ossea*.

MR. TURNER said he felt bound to protest on behalf of



civilization. He agreed with Mr. Sutton that civilization was blamed for a great deal that could not justly be laid to its charge; in fact, most of the troubles for which it was said to be answerable should rather be attributed to the want of it. Perfect civilization was the highest development of man, mentally, morally, and physically, and it should not be blamed for all the evils brought about by the influences of fashion and habit. The majority of these evils, diseases of the teeth amongst them, were due rather to want of common sense than to civilization.

The PRESIDENT said the time had arrived for closing the discussion, and he must now call upon the author of the paper for his reply. He should be glad to know if it had really been proved by observation that the cartilage islands did develop into exostoses, or whether this was only a matter of theory or inference.

MR. SUTTON remarked that writing a paper was a simple matter compared with the task of briefly answering the long list of questions and criticisms which had been addressed to him. Careful observations were daily confirming the fact which he had stated, viz., that all animals, both small and great, from the water-flea to the elephant, were liable to disease. The connection between tartar and Riggs' Disease, whether it was a cause or result of the disease, was, he knew, a moot point; but it was at all events interesting to find that animals suffered from a disease very similar to that which was met with in man, and known as pyorrhoea alveolaris. Hyperostosis was not a very rare disease, but he was sorry to hear that Mr. Weiss had been unable to follow up the history of his case.

With reference to the connection between "cartilage islands" and exostoses, it was of course impossible actually to demonstrate the fact in any given case, but at the same time the fact that these cartilage islands were so frequently found in certain situations, and that exostoses also occurred in the same situations, appeared to him quite sufficient proof of a connection between the two; just as people in general connect thunder

with lightning. Mr. Canton's exostoses on the inner side of the lower jaw no doubt owed its origin to a remnant of Meckel's cartilage, which occupied that situation during a portion of foetal life. He knew that it was a common practice to speak of every overgrowth of bone as an exostosis, but this was not strictly correct. He thought that the prominence mentioned by Mr. Hutchinson was probably an overgrowth due to inflammation of the periosteum, and not a true exostosis. His definition of a tumour was that it was a new formation having a structure different from the tissue in which it grew, and having a tendency to increase; according to this, the mass of cementum surrounding the agouti's tooth was strictly a tumour.

He was sorry that he had not made his views on the subject of erosion, the connection between soft and bony tumours of the jaw, &c., quite clear to some of his hearers, but to explain these again at length would occupy more time than could be allowed him at that hour of the evening. He hoped, however, that a careful perusal of his paper when published would clear up most of these doubts and misconceptions. He had great pleasure in offering for the acceptance of the Society the specimens which he had exhibited to illustrate his paper, with the exception of the skull of the sea-lion, which did not belong to him.

The PRESIDENT then proposed a vote of thanks to Mr. Sutton for his paper, and for his valuable donations to the Museum, and also to Mr. Pedley, Mr. Henri Weiss, and other contributors of specimens, &c., which was carried with much applause.

He then announced that at the next meeting (May 4th) Dr. St. George Elliott would read a paper on "Bridge-work," and some interesting communications had been promised by Mr. Dunn, of Florence, Mr. W. A. Hunt, and others.

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DR. GEORGE FIELD showed, after the meeting, an electric dental engine and battery. The electric engine was an improvement on one which he showed some months ago, being lighter and more compact; it weighed  $10\frac{1}{2}$  oz. The handpiece had a universal chuck; it made very little noise when in use.

The battery used by Dr. Field, both for the engine and the electric mallet, was one supplied by Messrs. Coxeter & Nehmer, spoken of about six months ago by Mr. Walter Coffin, at one of the Society's meetings. The carbons were 2 feet in length and 3 inches in diameter, giving a current of large quantity and very high electro-motive force. The cells might be placed in any part of the house, at a distance from the operating room, without there being any appreciable loss of strength; though as there were no acids used and no fumes evolved, the battery might be placed in the operating room if convenient. One advantage of this form of battery was that it would do a very large amount of work without re-charging. Used on an average for five hours a day, it would work satisfactorily for six or seven weeks without re-charging, and if only occasionally used would go on for three months without attention. That shown by Dr. Field consisted of twelve cells, and by means of a shunt either half could be used, or the whole number.

DR. WALKER also sent for exhibition an 8-celled Leclanché battery, made by the Indiarubber and Gutta-percha Company of 106, Cannon Street. It was contained in four oblong boxes, each box being divided into two cells. Each cell was lined with zinc plates, and contained six carbon blocks, surrounded by four agglomerate pillars. The arrangement of the cells and connections was such as to afford the greatest motive power at the least expense to the battery. This could be maintained at full power for 100 hours. When the current became weak, the carbon blocks and agglomerate pillars must be detached, brushed with a hard brush and placed in fresh solution, when the power would be completely regained.



The commutator shown with the battery was a new instrument with nine platina attachments. With the arrow of the index at 0, the battery is at rest; when pointing to 4, four cells are engaged, and by moving it on, 6, 7, or 8 cells would be brought into circuit. The cost of battery and commutator was £17 12*s.* 6*d.*

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# Odontological Society of Great Britain.

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## ORDINARY MONTHLY MEETING.

*May 4th, 1885.*

RICHARD WHITE, L.D.S.ENG., VICE-PRESIDENT, IN THE  
CHAIR.

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THE Minutes of the previous meeting having been read and confirmed,

MR. WILLIAM PENFOLD signed the Obligation Book, and was formally admitted to membership.

MR. EDWARD LATCHMORE, L.D.S.Eng., of 21, Upper Baker Street, Regent's Park, was balloted for and elected a Resident Member of the Society.

MR. S. J. HUTCHINSON announced that he had received from Mr. Oakley Coles some pieces of hippopotamus ivory studded with curious masses of secondary dentine. He had not yet had an opportunity of making sections and examining the specimens carefully, and would not venture to give any explanation of their nature until he had done so.

MR. E. LLOYD WILLIAMS exhibited a model of the upper jaw of a lady, aged sixty, showing a large mass of hypertrophied gum tissue attached to the palate by a large flat pedicle. The occurrence of such growths in connection with the wearing of plates was not uncommon, and this one was remarkable only on account of its size. The patient had worn a plate, retained by springs, for fifteen years.

MR. CHARTERS WHITE remarked that such growths were often met with in patients who had been wearing for some

time a misfitting plate. In this case the edge of the plate had evidently cut into and irritated the mucous membrane of the palate. He thought the best plan would be to make a plate to cover the whole of the palate, the pressure of which would soon cause the disappearance of the mass.

MR. BROWNE-MASON (Exeter) exhibited models of the mouth of a girl, aged eleven, showing a remarkable malformation of the jaws. The upper jaw receded so that the incisors closed a quarter of an inch within the lower, and the only teeth which articulated properly were the first permanent molars on the right side. He should be very glad to receive any suggestions as to treatment, though he feared the case was incurable.

He also handed round a model which he had received from Mr. Parkinson, of Bath, showing unusually large and well-formed supernumerary laterals.

MR. W. A. HUNT (Yeovil) read the following notes of an instructive case of Neuralgia coincident with the advent of the wisdom teeth :—

“A lady vocalist, some three years ago, suffered greatly from ordinary neuralgic pains on the right side of the head, affecting all three divisions of the fifth nerve, with pain apparently located in the first right lower molar. An irregular practitioner extracted this tooth, which he said was sound, but the patient experienced little benefit. Under the hands of her medical attendant, after a six months’ course of quinine, &c., the pain did, however, slowly abate, but only to return as badly as ever on the *left* side.

“She then consulted me, but, she said, with little hope of obtaining relief. Her age was twenty-eight, and her general appearance healthy, but the pain made her miserable. Her teeth were all well formed and regular, but seemed firmly compressed against each other. The right lower wisdom tooth only had been erupted, and on this side the first lower permanent molar had been extracted, as already mentioned.

“The advancing wisdom tooth must, I thought, have been the cause of her pain, and had the second molar been extracted



instead of the first, relief would have followed almost at once, instead of taking nearly six months and the expenditure of so much medical skill and quinine. I therefore examined the left side carefully, and by passing a fine probe through a little dimple in the gum, I felt the wisdom tooth beneath. I at once removed the second molar under gas; some relief was at once experienced. I advised her to discontinue all medical treatment, and in two or three days the pain entirely subsided.

“A year elapsed and she again consulted me with the same kind of symptoms on the *right* side. Here I could see a presenting cusp of the upper wisdom tooth. I extracted the second molar and relief again followed.

“In six months' time she again presented herself with the same typical pain on the *left* side, but more severe than ever. The most careful and prolonged examination failed to disclose the slightest sign of the advent of a wisdom tooth, or even of its existence; yet from former experience I, without hesitation, extracted the second molar under gas, and I have here the tooth for your inspection. The specimen clearly shows the injury done by the advancing, though buried, tooth; the distal half of the posterior buccal root and some of the crown have disappeared, and the nerve canal is completely exposed for more than half the length of the root. It was impossible to diagnose this till after the extraction. The operation was followed by immediate relief, and the patient is now absolutely free from neuralgia.

“I may observe that no signs of local inflammation or irritation were discoverable from first to last in this case. The treatment adopted of extracting a useful second molar instead of digging out the less useful third molar, was, I believe, correct in this case. All four wisdom teeth were large, well-developed, healthy teeth, and eventually took up excellent and useful positions.

“The case is instructive, as its history is so definite and complete, and strikingly illustrates cause and effect no less than four consecutive times in the same individual; and lastly, as illustrating the serious and unsuspected damage that a

buried tooth can inflict by pressure against the roots of a neighbour which stands in the way of its progress."

THE CHAIRMAN said Mr. Hunt's case, or rather series of cases, was exceedingly interesting. He thought that trouble of this sort from the wisdom teeth was more common than it was generally considered to be. At all events, he met with such cases pretty frequently in his own practice, and had almost come to look upon the wisdom teeth as natural enemies, to be got rid of whenever an opportunity offered. Recently his son, Mr. Wentworth White, had asked his advice with regard to a gentleman, aged forty, who had for some time been suffering severely from neuralgia affecting the left side of the face. He had consulted another practitioner, who had extracted the second upper bicuspid, which was found to be sound, and this gave no relief. Mr. White could find nothing wrong with the teeth on that side in the lower jaw, but on carefully testing the upper teeth the second molar was found to be sensitive, and it was decided to extract it. It was then found that the pressure of the wisdom tooth had made a cavity on the distal surface. The patient obtained immediate relief.

MR. J. S. TURNER thought that most of those present must be familiar with such cases. The wisdom tooth, however, was not the only tooth which was capable of causing mischief of this sort. At the March meeting Mr. White showed a lateral which had undergone very extensive absorption, owing to the pressure of a neighbouring tooth, and quite recently he had himself removed a lateral in exactly the same condition, absorption having taken place to such an extent as to expose the pulp cavity, due to the pressure of the canine, which was coming down in front of it. A remarkable feature of the case was that the patient, a youth, said it had not caused him any inconvenience.

MR. C. J. B. WALLIS showed the skull of a Zulu, a very fine hippopotamus skull, the jaws of a sword-fish (also a very fine specimen), and the jaws of a large extinct animal, which

he believed to have been an ichthyosaurus; this last had been dug up in Egypt.

MR. HUTCHINSON remarked that the hippopotamus skull was a magnificent specimen, and begged Mr. Wallis to use his influence with the owner to induce him to present it to the Society. The skull then in the Museum was not nearly such a fine one.

MR. D. HEPBURN showed a model of the mouth and jaws of a young man, aged twenty-three, who had been treated at St. George's Hospital thirteen years ago for "fever." He had at the same time some necrosis of the jaw, and extensive sloughing of the soft parts. Cicatrization eventually took place, but accompanied by ankylosis of the lower jaw. The jaw was now practically immovable; he had not the slightest power of mastication, and only a very small aperture between the teeth on the left side of the mouth. Contraction seemed to be still going on, for the upper teeth were being slowly forced outwards. In spite of his inability to masticate, the patient enjoyed very good health, and Mr. Hepburn did not feel justified in advising any operative interference at present.

MR. R. H. WOODHOUSE showed a model of the upper jaw of a man, aged thirty-four, which had been sent to him by Dr. Walker. At the age of ten the right permanent central was broken at the cervical line by a blow from a stone. Abscess ensued, and the root was extracted three or four months after the accident. Three years ago, seventeen years after the accident, the right permanent canine showed signs of eruption. The permanent right lateral and temporary canine were firmly articulated.

He also handed round a model of the upper jaw of a young man, aged seventeen, which had been sent as a donation to the Museum by Mr. Adams Parker, of Birmingham. His first dentition was perfectly natural. With the second dentition a supernumerary tooth appeared to the right of the middle line; this became loose and was extracted, when a second supernumerary tooth appeared in the same position. It was firmly implanted and quite sound.



The CHAIRMAN then called upon Dr. St. George Elliott for his communication on "Bridge-work."

DR. ELLIOTT said the subject of his communication was one which had not as yet been often discussed at meetings like the present. Indeed, it was comparatively a new subject. For although Bridge-work was not actually a new invention,—he had himself seen fifteen years ago a good example of this kind of work in the mouth of a patient, and it had been in use fifteen years at the time he saw it,—yet it was only during the last five or six years that it had come into anything like common use in the profession. Like other methods it might be carried to an extreme, and used without judgment in cases where a plate would have answered much better; still it was very useful in suitable cases. Patients were sometimes met with who had a very strong objection to wearing a plate. Singers, for instance, found a plate very inconvenient; very nervous and irritable patients also not unfrequently objected to them. In such cases "Bridging" often afforded a satisfactory means of remedying defects.

It was sometimes asserted that bridge-work was likely to cause trouble, and do harm to the teeth which served as supports, owing to the difficulty of preventing accumulation of food about the parts; but this was a mistake. The work might and ought to be done in such a manner that no inconvenience whatever should arise from this cause, and perfect cleanliness could be maintained by the patient with less trouble than where a plate was worn.

He had prepared some diagrams which would illustrate some of the conditions under which this method of treatment might be beneficial. The first case he would mention was that of a German Baron, who was first treated on this plan about five years ago by a dentist at Dresden. In this case the right upper lateral and canine had been fastened to the first bicuspid and central. The bar was attached at one end to the lingual aspect of the central by a gutta-percha filling, and was anchored at the other end to the bicuspid by a gold filling. It was evident that a considerable strain fell upon

the central, and it might have been supposed that the gutta-percha stopping would have given way, but it did not. The work lasted two years, and then the lateral broke off from the bar. The patient came to Dr. Elliott in order to have the breakage repaired; he expressed himself as highly satisfied with what had been done, declaring that he had never had any comfort from artificial teeth until he had this bridge in place of a plate which he had previously been wearing. Dr. Elliott removed the piece with some difficulty, replaced the lateral, and refastened it as before to the central, only using gold instead of gutta-percha. This time it only lasted six months, when the central, to which the bar was attached, broke off. Dr. Elliott then cut down the stump of the central to the level of the gum, and attached to it a porcelain crown with a gold backing by means of a screw pin and nut. One end of the bridge was then soldered to the gold backing, and the other carried to the bicuspid and securely anchored to it by amalgam. This had lasted well, and had given great satisfaction to the patient.

Some amount of judgment and experience was required in adapting this method to particular cases. As an illustration of this he would mention a case which had come under his notice. The patient had lost his right upper lateral, and to replace it the dentist had devitalized the canine and inserted a platinum wire in the nerve canal. This wire, after being anchored by gutta-percha, was bent at right angles, and had a lateral soldered to it. No protection was given to the canine other than that afforded by the gutta-percha, so that the tooth soon decayed and gave way, the bar bent under the strain of mastication, and the lateral was forced up into the gum. Dr. Elliott removed the appliance, cut down the canine to near the gum, and fitted on a gold-backed plate tooth, with a hole through the gold for the passage of a screw which was anchored in the stump by amalgam. The lateral was soldered to the pivot thus made, and on the mesial side of the lateral a pin was soldered which passed into a small cavity already existing in the central, where it was secured by a filling. Subsequent experience proved the value of

having the bridge detachable, for after the appliance had been worn for some months the pin in the central gave way; the bridge was then quickly removed by unscrewing the nut, a new pin soldered on, and the apparatus replaced.

Dr. Elliott considered that the attachment of an artificial crown by means of a screw and nut was decidedly the best mode of pivoting for these cases, on account of its being easily detachable in case of accident. This was almost impossible when bridge-work was attached to crowns fitted on the Richmond principle. He found also that it was very difficult to prevent food and mucus accumulating under the overlapping edges of these crowns and leading to bad results. His experience of this method of pivoting dated back some five or six years, the results at first being most discouraging. These failures taught him that in order to obtain satisfactory results he must make his own screws. He found that when he used those sold by the dépôts the nuts came unscrewed and the crowns came off, frequently in two or three weeks. The screws must be much finer than those usually sold, and the nuts must be conical and cut half through, so as to make them self-locking. He found also that aluminium bronze or German silver were better materials for the screws than platinum, since they became slightly oxidized, and thus held more securely.

DR. G. FIELD said he had not used bridge-work very extensively, but he found that in exceptional cases it answered admirably, and he used it under favourable conditions with great satisfaction to himself and to his patients. He had, of course, met with failures, but these had not been sufficient to discourage him, or to induce him to give up the method. He preferred the Richmond crown, or the Webb flat pivot tooth with gold backing, to the use of screws and nuts. In some cases he anchored the ends of the bar into adjoining natural teeth by means of gold fillings. The fillings would break away occasionally,—this could not altogether be prevented,—but as a rule they lasted very well. In one case where this happened, the patient being unwilling



to submit to having another gold filling inserted, he filled with osteo; and although the filling had required attention from time to time to repair the effects of surface disintegration, it had lasted very well. He did not approve, as a rule, of the plan of bridging over four or five teeth, and had only seen one case in which this had been satisfactorily accomplished. The objection on the score of uncleanness was entirely theoretical; the bridge could always be made of such a form as to be easily kept clean.

DR. A. S. RICHMOND said the subject under discussion, crown and bridge-work, was one to which he had given some attention, and which interested him greatly. Dr. W. M. Morison, of St. Louis, the inventor of the Morison chair and engine, was, he believed, the first to make gold crowns encircling the roots of molar and bicuspid teeth; this was in 1868. In 1876, Dr. Cassius M. Richmond, who was then practising at San Francisco, produced the "Richmond crown." This was a porcelain, or porcelain-faced, crown attached to the natural root by a pin or tube, the attachment being strengthened by a gold band encircling the root. This method was still employed by the best operators throughout the world, and had never been improved upon since.

With regard to bridge-work he would hand round some models of cases which had been under his own care, showing various adaptations of the method. He had a piece of bridge-work in his own mouth which was put in in 1876, and which had therefore stood the test of nine years' wear. In 1878, he had a case in which a loose and decayed lateral adjoined a sound and healthy central. After trying various experiments with the lateral, he extracted it and attached a lateral crown to the central and canine; the work had stood well up to the present time. Early in 1880 he pivoted a first molar with a Morison gold crown and the canine on the same side with a porcelain-faced crown, connecting them by a bridge carrying the two bicuspid; this also was still in use. These cases might serve to show the lasting character of the work. There was no difficulty whatever in keeping it clean, the teeth being

supported clear of the gum, and the whole fitted as it should be in a proper workmanlike manner.

DR. W. MITCHELL said he had had a case to deal with that day in which he had been obliged to modify the ordinary Richmond method. He had occasion to remove a Bonwill crown, but found the pin so firmly fixed in the root by amalgam that he found it impossible to remove it. He therefore cut it off even with the gum margin, and then with a fine fissure burr removed the amalgam all round it to the thickness of about two lines, and to the depth of about a quarter of an inch. He then made the band as usual, soldered on the top, and made a platina tube to fit the pin. He then cut away a portion of the top, placed the band and tube in position, and waxed them together in the mouth. They were then removed in their proper relation for soldering, after which he replaced them and fitted the tooth in the ordinary way. Then, after waxing together and investing in sand and plaster, the soldering was completed and the work was polished and inserted in the mouth, where it fitted perfectly. He thought this plan was really an improvement on the usual method, for the tube added stiffness to the structure, making it much firmer than where the ordinary pin alone was used. Where amalgam was used for setting the pin, of course platina both for pin and tube was indispensable, but he did not see why a good strong cement could not be used with advantage.

MR. J. S. TURNER said that whilst he could not help admiring the ingenuity displayed in these methods of pivoting and bridge-work, he was rather at a loss to know what was gained by all this elaboration. The results might be perfectly satisfactory in a certain number of cases, but it must be remembered that operators did not always know of their own failures. When patients were dissatisfied with what had been done for them by one practitioner, they were apt to go to another. He had lately come across a patient who had had five front teeth pivoted sixteen years ago, viz., two centrals, a lateral, and two canines, and they were still

firm and useful. The pivoting was done in the old-fashioned way: the roots were cut down and polished, a pin inserted in the canal, and a model taken, then a tube tooth was fitted, first on the model and then to the root, a little floss silk being wound round the pin before it is forced into the root. The plan of pivoting with nuts and screws might sometimes be useful, but he thought that the insertion of the screw and tightening the nut must be a more unpleasant process than fitting a pin into the canal in the old way. He had seen many cases when with Mr. Cartwright of teeth which were shed in the ordinary course of nature with pivot crowns attached which had been in use for a great number of years, and others must have frequently met with similar cases. Seeing then that the results of the old method were generally so satisfactory, he failed to see the advantage of these later and more elaborate methods.

MR. R. H. WOODHOUSE said he had lately removed a pivoted tooth which had been in use for twenty-three years; the crown was quite firm, but the root was absorbed. He thought this was a triumph for the old method.

The CHAIRMAN said he had personally no experience of bridge-work, and he was disposed to agree with Mr. Turner that there was no great necessity for the use of screws and nuts. He had been in practice a good many years, and he thoroughly agreed with what Mr. Turner had said as to the good results obtained by the old method of pivoting stumps with natural teeth. The pin was made of *hard* gold; a little floss silk was wound round it, it was then moistened with mastic varnish, and forced well up the canal. Teeth pivoted in this way lasted from twelve to thirty years, and the pin never came out—no one ever thought of its doing so. He felt bound to admit, however, that he had not been quite so successful with mineral teeth. He would now call upon Dr. Elliott to reply.

DR. ELLIOTT said he had himself used the old method of pivoting, but he wished to advance with the times. The



weak point of the method described by Mr. Turner was that the front edge of the tooth resting on the front of the stump gave a considerable amount of leverage, and as the result of any strain on the tooth the pivot was sometimes pulled out. Thus a patient of his who had a tooth pivoted in this way lost one crown and bent another. Another objection was that the pin would sometimes stop short in the canal, and use what force you might you could not get the crown close up to the stump.

In his lectures at the National Dental Hospital he had been in the habit of describing sixty different methods of pivoting, but he only used two in his own practice, viz., the one he had already described and the Flagg process. This latter method he considered a very good one, and quite as simple as the older method; but though one of the best for front teeth, it was not as well adapted to bicuspid as the other. A plain plate tooth was soldered to a pin; this was passed up the nerve canal and packed all about with amalgam. He had brought his drawer of pivoting instruments with him in case any of the members present might like to look over them.

The CHAIRMAN thanked Dr. Elliott in the name of the Society for his interesting communication, and also Messrs. Hunt, Lloyd Williams, Browne-Mason, Boyd Wallis, and other contributors of specimens and casual communications.

The next meeting, the last of the present session, would take place on June 1st, when Mr. Chas. Tomes would give the results of some Experiments on Amalgam Fillings, and casual communications had been promised by Dr. St. George Elliott and others.

The Society then adjourned.

# Odontological Society of Great Britain.

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## ORDINARY MONTHLY MEETING.

*June 1st, 1885.*

C. SPENCE BATE, F.R.S., PRESIDENT, IN THE CHAIR.

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THE Minutes of the previous meeting having been read and confirmed,

MESSRS. HERBERT PARKINSON, ALEXANDER KIRBY, and EDWARD LATCHMORE signed the Obligation Book, and were formally admitted to Membership by the President.

MR. CHARLES ALFRED ROBERTS, L.D.S.Eng., 44, Devonshire Street, Portland Place, was balloted for and elected a Resident Member.

MR. OAKLEY COLES announced, in the absence of MR. WEISS, that the following donations had been made to the library:—

“Das Füllen der Zahne mit Gold, &c.,” von Wilhelm Herbst.

“Praktische Darstellung der Zahnersartzkunde,” von Philipp Detzner.

“Proceedings of the Royal Dublin Society.”

“Transactions of the Royal Dublin Society.”

MR. S. J. HUTCHINSON announced that he had received the following donations for the Museum:—

From Mr. Walter Coffin, models of the mouths of members of the Kostroma family.

From Mr. Oakley Coles, a remarkable specimen of calcification of the pulp, or “pulp-stone.”

And from Mr. Redman, of Brighton, a number of interesting specimens, including a bicuspid which appeared to have been split by the pressure of gas in the pulp cavity; two lower first molars, showing absorption of the root and exposure of the pulp, caused by the pressure of the second bicuspid; a wisdom tooth with four roots; several lower second molars with three roots; a molar with a curious nodule of enamel attached to the side of the crown; a bicuspid with dilacerated root, and a wisdom tooth with a remarkably curved root, both of which must have been very difficult to extract.

MR. REDMAN said that, with reference to the lower molars with absorbed roots, it might be interesting to state that the patient to whom they had belonged, a young lady, aged fourteen, had, at the time she came to him, been under treatment for two years suffering from reflex spinal irritation, which was said by her medical attendant to be hysterical. Mr. Redman found the bicuspids low down, and wedged between the neighbouring teeth; he extracted the first molars, and found them in the condition now shown. The patient called upon him some time afterwards to thank him for what he had done, saying that she had lost from that time the pain in her back and weakness, and had got quite well.

The case of the split bicuspid was also interesting. The patient suffered agonies of pain for two days, when it suddenly ceased and she found that the tooth was "loose." When she came to Mr. Redman the tooth was split vertically down the middle; it was perfectly sound, and *it had no antagonist.*

The PRESIDENT said that, by a curious coincidence, he had brought with him the model of a case somewhat similar to that just related by Mr. Redman. The patient had been suffering for some days severe pain, which she attributed to a second right upper molar, which she thought was decayed and into the cavity of which she had forced as much cotton wool as she could. When she presented herself, the tooth was still painful, but, instead of being decayed, it was found



to be vertically split from crown to base. The tooth had been superficially filled some thirty years before by the late Mr. Sheffield, of Exeter, with tinfoil faced with gold, and the filling, except that the fracture traversed its walls, was in a well-condensed and perfect condition. The cotton wool which had been forced into the cleft, and which kept the fragments apart, was removed; the cavity was cleansed, a dressing of carbolic acid and glycerine inserted, and an elastic band placed round the tooth. Next day the tooth was easier and the same treatment was repeated. On the third day the dressing was again changed, and instead of the elastic band some gold wire was placed round the tooth and screwed up until the two fragments were brought into close contact. After three or four days the gold was removed, the rubber dam applied with a clamp, the old stopping drilled out, and the cavity thoroughly cleansed and prepared to receive a filling. The surface of the cavity was then washed with a brush dipped in a thin solution of gutta-percha in chloroform, and the two sides of the tooth again brought together by a band, formed of several coils of soft platinum wire. The cavity was then filled with Eclectic Amalgam, rotated in with smooth points. The rubber dam was then removed, but the platinum wire retained. The tooth had remained comfortable up to the present time, and appeared likely to be permanently useful.

The President also showed a case in which the second and third upper molars were united into a single tooth, and also a permanent incisor which had been split longitudinally previous to eruption, and the interspace filled up with new dentinal tissue.

MR. S. J. HUTCHINSON said he had met with three cases of split teeth during the last two years. In these cases he had bound the teeth round with iron binding wire, and they had remained quiet and useful. The wire turned black, but it did no harm to the teeth; it was very tough, but soft and easily applied. In future, however, he should try platinum wire, as the President had suggested, for he found that the iron wire needed renewing at the end of six months.

MR. A. WILSON (Edinburgh) presented to the Society's Museum a skull of the Bandicoot rat (*Mus giganteus*), and in doing so drew attention to the peculiarity of the socket of the lower incisor, terminating as a strongly marked process directed upwards and backwards from the base of the condyloid process; that in the common rat ending as a mere tubercle at the base of the coronoid. He exhibited a human lateral incisor which simulated in a very remarkable degree the third incisor (second lateral) of the horse. Also the upper central incisor of a *Hypsiprymnus* (Kangaroo rat), showing the enamel terminating by a well-marked curved margin beyond which the tooth (root ?), was decidedly smaller. He thought it went a long way to prove that the statement usually given as to this tooth being one of persistent growth was erroneous.

MR. OAKLEY COLES said, with reference to the model of the Kostroma boy which had been presented by Mr. Coffin, that about five years ago Mr. Charles Tomes and himself had carefully examined and taken models of the mouths of both this boy and his father. The upper jaw of the father was edentulous, and he had, so far as he (the speaker) could recollect, only two teeth in the lower jaw. The boy, then said to be ten years of age, had also an edentulous upper jaw and only one incisor in the lower. Since then a considerable change had taken place, for he had now three incisors in the lower jaw, two of which, however, had broken away, two canines in the upper jaw, and he (Mr. Coles) thought he could distinguish signs of the approaching eruption of an upper molar. A remarkable peculiarity about the models which were taken by Mr. Charles Tomes and himself, which he believed were somewhere in the Museum, was that the jaws of the father and of the boy were almost identical in size. Since then those of the boy had undergone a considerable amount of development, and there was also an increase in the number of teeth, facts which seemed rather to confirm the opinion held by many authorities that the size of the jaws depended to a considerable extent on the eruption of the teeth.

MR. CHAS. TOMES said he quite remembered the occasion spoken of by Mr. Oakley Coles. The man was very toothless, and had a remarkably small jaw. The boy was not so hairy as the man, and was now inclined to have more teeth. He noticed also, at the time he assisted in taking the models, that whilst the alveolar borders of the man's jaw were thin and sharp, those of the boy were more rounded. Some appearances in the model now handed round suggested the idea that some teeth might have been extracted. Did Mr. Coffin think that anything of the kind had occurred?

MR. WALTER COFFIN replied that he did not think the boy had ever had any more teeth than those shown in the model. He had seen a model taken at Paris twelve months previous to this one, and the state of things was just the same, except that one of the incisors, which had since broken off, was then standing.

MR. W. A. MAGGS showed a model of a case of abnormal dentition, and gave the following particulars with reference to it.

The patient was a boy, aged eleven, a small but intelligent lad, the third child of a family of five; there was nothing unusual in the dentition of the others. There were no signs of rickets or of syphilis, and he had never suffered from any acute disease. His father stated positively that no teeth had been extracted. All the molars, except one of the first set, the second bicuspid, and the lower central incisors, were absent. The boy had been sent to Mr. Maggs for his opinion, having been refused admission into a naval school solely on account of the absence of his molar teeth, being considered eligible in all other respects. As the boy would be eligible for admission up to the age of thirteen, the question of prognosis was of some importance. From the appearance of the mouth Mr. Maggs was disposed to give an unfavourable opinion, but he should be glad to hear those of some of the members present.

MR. OAKLEY COLES said he had exhibited and presented to the Museum some years ago models of the mouth of a boy



aged thirteen, showing a condition of things very similar to that seen in Mr. Maggs' case, and he could state with regard to the patient that when seen three years later there was still no appearance of any molars.

The PRESIDENT read a communication from Mr. H. C. Quinby, of Liverpool, in which he suggested the use of a mixture of equal parts of the hydrochlorate of cocaine and arsenious acid for devitalizing tooth pulps. In the few cases in which he had tried this combination the results had been very satisfactory, the arsenic doing its work as usual, whilst the cocaine saved the patient the *mauvais quart d'heure* which ordinarily resulted from the application. He rubbed the crystals of cocaine and arsenic together in a mortar until they formed a stiff paste. The tooth should be syringed with warm water, then dried, and a small portion of the paste—which he found by careful weighing to be about a twentieth of a grain—placed on the exposed pulp, and covered with cotton wool and sandarach or mastich in the usual way. He hoped members would try this, and report the results.

The President then called upon Mr. Chas. Tomes to give an account of his experiments with Amalgam Fillings.

MR. CHARLES TOMES said he felt almost ashamed to bring before the Society the very small number of experiments which he had lately made with reference to the behaviour of amalgam fillings, more especially after the far more extensive and varied series of tests which had been carried out not long since by Dr. St. George Elliott. But though the experiments he was about to refer to were few in number, they were carried out on different lines from those made by Dr. Elliott, and they were of a very practical tendency. He thought, therefore, that it would be as well to place the results before the Society, more especially as it would be some time before he should be able to continue them.

The object of his experiments was to ascertain the best method of packing amalgams so as to obtain watertight fillings, using the amalgams under the conditions under which they were most valuable. He had not, therefore, used

them very dry, but always sufficiently plastic to work easily. He had been led to make the experiments by Dr. Bonwill, of Philadelphia, who had shown him last Christmas some amalgam fillings of exceptional excellence, and who had also demonstrated to him his method of filling, which was quite different from any which he (Mr. Tomes) had ever seen before. Dr. Bonwill inserted the amalgam in a thoroughly plastic condition, then covered the surface with a pad of blotting paper or a piece of amadou and subjected it to very considerable pressure, removing from time to time the more fluid portions which were forced out round the edges. In order to be able to apply this pressure effectively, Dr. Bonwill, in the case of proximal fillings, either fitted a matrix, or used the next tooth as a matrix, or when there were two approximate cavities he filled the two together and then cut through the intervening portion of amalgam. The great difference, therefore, between Dr. Bonwill's method—which had been well described by Mr. Ewbank in the *Journal of the British Dental Association* for April—and that usually adopted, was that the excess of mercury was squeezed out after the amalgam had been inserted into the cavity instead of before.

In order to satisfy himself as to the advantages of this method, he (Mr. Tomes) had inserted a certain number of fillings in this way, and others in the manner usually adopted, and had tested them with Draper's ink. It was sometimes said that Draper's ink was too severe a test, but this could scarcely be the case. For if a plug was really watertight no ink could stain it, and if the stain did penetrate it was quite evident that either the amalgam had undergone some contraction in setting, or that the filling could never have been watertight.

Briefly stated, the results of his experiments were as follows. Using Dr. Bonwill's amalgam and packing it with burnishers in the usual way he did not get a watertight filling under any circumstances, and the same result followed when other amalgams were used. But if the amalgam was packed according to Dr. Bonwill's method, a filling was

obtained which was watertight everywhere *except where there was a chamfered edge*. The Standard alloy and Welch's amalgam gave equally good results with Dr. Bonwill's amalgam under these conditions, as they had given bad ones under the former.

The fact to which he had just referred, viz., that leakage occurred in all cases where the cavity had a bevelled edge, to the extent of that bevelling, whether the filling had been inserted by Dr. Bonwill's method or not, was an important one. Feather-edged fillings could not always be avoided, but it was clear that if amalgam be used under these circumstances, a watertight filling must not be expected. Of course this did not apply to gold fillings, but for amalgam the edge of the cavity must always be square.

Some other experiments had been tried by Mr. Baldwin and himself. For instance, they had put in a piece of iron wire roughly bent to fit the contour of the cavity, and had filled with amalgam over this. This gave fair results, but not so good as those obtained by Dr. Bonwill's method. Then they tried the plan of inserting fragments of old amalgam fillings in the midst of the fresh material, with the idea that, as there would be less of the amalgam to set, there would be less contraction. These also gave fairly satisfactory results. Then Mr. Baldwin tried inserting a large piece of old amalgam, roughly shaped to fill the cavity, and packing this round with fresh amalgam; but this did not answer, owing to the difficulty of getting the fresh amalgam properly packed and avoiding air spaces. They had also tried letting the amalgam set a little before using it, but this did not answer at all.

The result of one experiment certainly surprised him. He filled a cavity with Davis's gold amalgam and dropped it at once into the ink-bottle, and, on examining it after the lapse of ten minutes, whilst it was still quite soft, he found that it had leaked badly. This seemed to indicate either that the initial contraction of this amalgam must be rapid and great, or that to insert an amalgam filling in such a manner as to be in absolute contact with the walls of the cavity was by no



means so easy an operation as it was usually considered to be.

Lastly, they had filled cavities in the ordinary way, allowed the amalgam to set, then ploughed a groove all round the margin and filled this with softish amalgam; these had stood the test well. The result, however, of all these various experiments, so far as they had gone, went to show that Dr. Bonwill's method yielded the best results, as well as being the easiest of application.

For the purpose of these trials they had taken molars with large cavities not too simple in form,—just the cases for which in practice amalgam would generally be used,—and they had inserted the fillings with average care. The experiments had not been sufficiently numerous or varied enough to prove anything conclusively, and must simply be regarded as suggestive. But, so far as they went, they seemed to indicate that the use of a good plastic amalgam according to Dr. Bonwill's plan afforded prospects of a success greater than that usually obtained.

DR. ST. GEORGE ELLIOTT said he was very pleased to hear Mr. Tomes speak so favourably of Dr. Bonwill's method of inserting amalgam fillings. Dr. Bonwill wrote to him (Dr. Elliott) about two years ago describing his method; he (Dr. Elliott) at once tried it, and finding it satisfactory he had used it ever since.

With regard to Mr. Tomes' experiments, when that gentleman told him what he was doing, he (Dr. Elliott) thought he would try some experiments too. He accordingly put in a hundred fillings of amalgam, oxyphosphate, and gutta-percha; they were inserted into simple cylindrical cavities, some large and some small, but bevelled at the edge, and *they all leaked*.

MR. OAKLEY COLES said that on recently examining a number of amalgam fillings, inserted in glass tubes and in ivory, which had been sent to the Society some time since by Mr. Fletcher, of Warrington, he noticed a fact of some interest in connection with the results obtained by Mr.

Tomes. Some of these fillings had stood the ink test well, others only fairly well, there being evidence of a certain amount of leakage,—in some cases extending to two-thirds of the thickness of the filling,—but in all cases both the upper and lower surfaces of the fillings were *cupped*. This was evidently due to a contraction of the amalgam in setting, and he thought it showed that the contraction was greatest in the direction of the least thickness, and would thus explain the curling up of the edges in shallow cavities or overlapping borders of fillings.

MR. F. CANTON said it seemed to be assumed that the most important point about an amalgam filling was that it should be watertight. But did the fact of a filling being watertight make it reliable? He believed it was generally admitted that gutta-percha fillings always leaked, yet it was well known that gutta-percha would prevent decay better than almost any other material.

MR. HUTCHINSON asked whether Mr. Tomes had tried the same experiments with the three amalgams he had mentioned, and whether the results were the same in each case? Had Mr. Tomes made any experiments with palladium amalgam or Sullivan's? He particularly wished to know if the experiment of examining the stopped tooth ten minutes after filling had been tried with each of the amalgams, and if the results were the same.

MR. STOCKEN asked whether any steps had been taken to ensure that the proportion of mercury to other metal should be the same in all cases. It was impossible to get definite results except with definite proportions. It appeared to him that Dr. Bonwill's process of squeezing would produce an effect which had not been referred to. The mercury which was pressed out and removed would not be pure, it would take out a certain amount of the other constituents and would remove these in very unequal proportions, and the composition of the filling which resulted would thus be considerably altered.

MR. STORER BENNETT remarked that amongst the specimens

of fillings inserted by the rotation method which had been sent over by Dr. Herbst, and which he had exhibited at a recent meeting of the Society, were two amalgam fillings. Great pressure was brought to bear on the material during the process of filling by Dr. Herbst's method, and it appeared to him that the pressure of the large rotating burnisher would produce much the same effect as that applied in the method described by Mr. Tomes. It would seem, therefore, that Dr. Bonwill and Dr. Herbst had been working independently on the same lines. Dr. Herbst also laid down the rule that no chamfered edge must be allowed.

MR. ANDREW WILSON said he thought the methods followed by Dr. Bonwill and Dr. Herbst differed most materially. That of Dr. Herbst was just that which Mr. Fletcher of Warrington recommended for his amalgam, only done with the engine instead of by hand.

DR. FIELD said he had never made any experiments out of the mouth, but he thought that most of the failures with amalgam filling were due to the fact that sufficient care was not taken in their insertion. The cavity should be carefully prepared, no thin edges being allowed, then the rubber dam should be fixed, and the amalgam inserted with considerable pressure; whether the engine or hand pressure only was used was, he thought, of little importance. Dr. Bonwill evidently used a considerable amount of force, and the result was a very compact filling. He himself was accustomed to use a hand burnisher, but with heavy pressure and removing the softer portions which appeared on the surface. He believed that if the same care was taken in the insertion of amalgam fillings as was taken with gold, failures would be much less common.

MR. BROWNE-MASON (Exeter) asked how it was that, if all this care was necessary for the proper insertion of an amalgam filling, their predecessors of forty or fifty years ago managed to put in fillings which lasted so well. Their method was certainly not elaborate,—in fact, from his recollection of his own immediate predecessor, the late Mr. Sheffield of Exeter, he should say it was decidedly “rule of thumb,”—yet he



frequently came across fillings which had been put in thirty or forty years ago, and which were still good. For one thing they did not approve of chamfered edges,—he found in all the fillings he examined that the edges were nearly straight,—and they were staunch patrons of that very excellent old preparation of Sullivan.

MR. WALTER COFFIN said a very similar method to that lately advocated by Dr. Bonwill had been practised for the last twenty years by his own father. His plan was to pack the amalgam with a large burnisher, using very considerable pressure, and removing with gold foil the excess of mercury which was thus squeezed out. The good results which he knew to have been obtained by this method led him to think highly of that now introduced by Dr. Bonwill.

MR. OAKLEY COLES said there could be no doubt as to the lasting qualities of Sullivan's amalgam, and it appeared to have a unique action upon the tooth. If a tooth containing an old Sullivan filling be split and examined, it would be found that the dentine forming the walls of the cavity was harder than that forming the rest of the tooth. The copper in the filling appeared to have some chemical action on the surrounding dentine. He thought sufficient attention had not been paid to the chemical action of fillings on the teeth. Certainly copper had some such action. He had heard it stated that workers in copper rarely suffered from toothache.

MR. CHARTERS WHITE said he had lately seen a very serviceable amalgam filling which had been put in by the medical officer at an up-country Indian Station, where of course there was no dentist, and he was informed that the metal used was obtained by filing a rupee.

MR. J. S. TURNER said he could remember the time when filing five shilling pieces for amalgam fillings was a regular part of the workroom routine. The filings were always afterwards tried over with a magnet, which removed a considerable amount of iron, and this made a great difference in the quality of the filling made from them.

MR. TOMES, having been called upon by the President for his reply, said he thought most of the speakers had taken his experiments too seriously, and he would repeat that he considered them suggestive only, and not as proving anything definitely. The amount of pressure exerted by Dr. Bonwill was very considerable, more than would be used during the insertion of an ordinary soft gold filling; in the case of a crown cavity he told the patient to close the teeth and bite hard. The amalgam was not used very soft, only thoroughly plastic; still even from such a mixture a considerable quantity of mercury could be squeezed out. He agreed with Mr. Coles' explanation of the cause of the leakage where there was a bevelled edge, viz., that the amalgam curled up as it set; and this was, no doubt, the cause of Dr. Elliott's failures. He himself had obtained watertight fillings by Dr. Bonwill's method, except at the feathered edge. Pressure applied with a burnisher had not the same effect as when applied over the pad of paper or amadou; it would be found that mercury could be squeezed out of a filling by this means where none could be got by the pressure of a burnisher. The pressure must be diffused over a considerable part of the surface of the filling. He remembered Mr. Walter Coffin telling him some years ago of his father's plan of applying pressure with a large burnisher and taking up the excess of mercury with gold foil. With regard to the preparations used in these experiments he must emphatically state that he had not intended to compare different amalgams, but only the different methods of packing. He had used more of Dr. Bonwill's amalgam than any other, and had not used palladium amalgam because he was already aware that he could make a watertight filling with it.

It might be true that the mercury would take out gold or tin from the preparation, but this did not matter in the least so long as the resulting filling was watertight, nor, so long as this result was obtained, did it matter whether the central and peripheral portions of the plug differed slightly in composition. It was, of course, well known that amalgam fillings would sometimes last forty or fifty years, but the average

duration of an amalgam filling was far short of this. In making these experiments the mercury used was not weighed, but the amalgam was mixed to the same degree of plasticity, and the teeth when filled were put into the ink-bottle at once.

There was one practical point which might be worth mentioning, since he had himself found it afford a useful indication, viz., that if, when the filling is polished at a subsequent sitting, no dark line can be seen round the edges, it may be considered satisfactory, but very often the line of junction was too distinct, and then leakage might be suspected.

The PRESIDENT then called upon Dr. Field for his paper on "Pivot Teeth attached by Cohesive Gold and Morrison Gold Crowns."

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*On the late Dr. Marshall Webb's Method of  
Pivoting Teeth, with some remarks on Morrison Gold  
Crowns.*

By GEORGE FIELD, D.D.S.

*Pivot-Teeth.*

IN the few remarks which I shall make upon this subject you must not look for anything new or original, either as to forms or as to methods. My only aim will be to present one or two arguments in favour of a modern and more elaborate method of attaching porcelain crowns to roots, sound or unsound. Much has been said in favour of the old wooden pivots and gutta-percha, and we can bear witness as to their durability, in many cases far beyond any reasonable expectation; but I believe they have had their day, and that, in the future, those of us who strive to keep up with all legitimate progress will seek something better adapted to the present dental conditions and the requirements of our patients, since both have changed.

As regards the former, are we not safe in saying that the quality of teeth is not what it was? *i.e.*, the present and the rising generations do not present to us so good a quality of tooth substance upon

which to build our good works as that which fell to the lot of our seniors. This alone is a very important factor in reference to the wonderful durability of many of the old pivoted roots, and when taken in connection with other facts—as, for instance, that rarely was any other than a sound root pivoted—we have the apparent superiority of the old method fully explained.

They were successes in spite of methods, the same as some gold and amalgam fillings saved similar teeth in the face of shrinkage, looseness, overhanging margins, &c.

On the other hand, let a few wooden pivots be inserted into roots from which the crowns have been lost by caries extending into the pulp cavity and canal, so that it is only with difficulty that we can obtain a solid foundation; and we should find that in such cases the average duration would not be so high as under the conditions first named. It is in the inferior quality of teeth, and under the less favourable conditions, that we claim superiority for the method which I present to-night.

It enables you to strengthen the porcelain crown by building the gold around it in one solid mass from the root canal to cutting edge or cusps; the same gold is nicely adapted to the end of the root, excluding all moisture, and may be so perfectly finished as to cause no more irritation than a tooth with its natural crown. It is not at all unsightly,

as the natural tooth may be so perfectly matched in colour and shape as to defy detection, while no more than a fine line of gold is sometimes discernible at or under the margin of the gum.

To fix such a pivot,—we will suppose the root to be in a healthy condition,—our first step is to enlarge the canal to as near the apex as prudence will admit; close the foramen, and still enlarge the canal as much as is consistent with the size of the root and quality of the tooth structure. Grind the end of the root level with the gum, and polish its marginal surface; fit the porcelain crown to the root and back it with thin gold. For pivot choose either square or triangular gold or platinum wire, and of correct length, sufficiently long to extend to the end of the canal when soldered to the backing. Now place tooth and pivot *in situ*, fasten them there with wax, and remove the whole carefully from the mouth; enclose in plaster and solder the pivot to the backing. Next, by means of corundum or emery disks, cut a groove on both sides of the porcelain and across the cutting edge, above the backing, into which the cohesive gold must be carefully packed. Having the tooth thus prepared, adjust the rubber dam, and fix the pivot into the root by means of a good quick-setting oxychloride cement, leaving a space of one or two lines between the porcelain face and the root, to be filled with gold. When the osteo



is sufficiently hard, remove enough from around the pivot to obtain a firm foundation for the cohesive gold; then proceed to build up the contour of the tooth into the grooves already mentioned. When completed, finish with great care, the same as a contour filling, giving special attention to the margins, for this is the weakest point in all our operations upon the teeth.

This is the method introduced by the late lamented Dr. Marshall Webb. I have practised it since he first demonstrated it to me some years ago.

I have not gone into all the details of manipulation essential to the success of the operation, as I do not pose here as an instructor, but have simply aimed at presenting those points or features which characterise it as a special method of pivoting teeth, and I do not doubt that any one who chooses to exercise his manipulative skill would be able to fix such a tooth as I have described.

### *Morrison Crowns.*

The advantages claimed for these crowns over a pivot tooth are, first, the ease with which they are fitted to bicuspid and molar roots; secondly, from the firm support given to the root by the closely fitting band and the great strength of the whole combination of band, cement, and pivot, they may be used on roots which would be con-

demned as useless for ordinary pivoting ; thirdly, it restores nearly to its original usefulness the masticating strength of the tooth.

The root should be prepared by cutting down to the gum, removing with a fissure burr any inequalities of the periphery and all the enamel edges. Using a strip of not less than 22 carat gold, of the width that will represent the length of the proposed crown, fit it as accurately as possible to the root, so that when soldered it will fit very tightly. The cap or cusps should then be struck up, fitted and soldered to the band, previously filling up the depressions inside the cap with solder, thus giving sufficient thickness to allow of cutting away, in order to obtain exact articulation with the occluding teeth.

The root canals should be prepared as for the Webb pivot, making use of similar wire, which should be firmly fixed into the canals by means of cement.

The pivots should extend above the root as far as possible without contact with the crown. The gum having been pressed from the root and all bleeding having ceased,—the parts must be kept dry by the rubber dam on the inferior teeth, but napkins may answer for the superior,—fill the crown nearly full with the chosen cement ; there must be a slight surplus, which, when the crown is fixed upon the root, will ooze out of a small

perforation previously made in one of the cusps. One or two smart taps of the mallet, using a piece of pivot wood as medium, will carry the crown well home, and the operation is complete. These crowns are especially adapted for cases where the bicuspid is considered too seriously decayed to admit of filling successfully. If, instead of extracting them and condemning the patient to the wearing of a plate, you will insert one of Morrison's gold crowns, you will find the result every way more satisfactory. The steel dies which will be shown you were presented to me by Dr. William Morrison, of St. Louis, and this gold crown was made from one of these dies. Dr. Morrison was the first to introduce this method of capping roots, although there have been since several modifications by others.

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## DISCUSSION.

THE PRESIDENT asked whether Dr. Field had not found putting on the rubber dam rather troublesome in such cases as he had described, and whether it was not rather a painful part of the operation ?

MR. OAKLEY COLES said that, instead of pressing back the gum, he had sometimes adopted a plan which answered very well, and which had the merit of not being painful, viz., that of making a bridge of oxychloride filling between the contiguous teeth, and use this as a point of resistance for the rubber dam. This arrangement kept the parts fairly dry and did not cause the patient any suffering.

MR. WALTER COFFIN asked whether the retention of the crown and pin depended mainly on the cement, or did the gold help to retain them ? And, if discoloration could be avoided, did gold offer any advantage over a good amalgam used in the same way ?

MR. HUTCHINSON said he was accustomed to make use of the following plan, which he found answered very well, and caused very little pain. He took a piece of pin wire about four inches long and passed one end of it through a lump of brown wax. He then put the end of the wire into the root canal, and pressed down the wax on the top of the root with his thumb. It would be found that the wax would force back the gum round the end of the root, and if removed would give a model of the root with the pin in position and the contiguous teeth. Or the wax could be pressed down until the top of the root was exposed, and the rubber dam applied over the wax and tied on with silk. Gutta-percha might be used in the same way, but the brown wax was more plastic and answered the purpose quite as well.

DR. FIELD, in reply, said that the rubber dam could be applied

with but little pain to the patient by adopting the following method. After the root has been properly prepared, the end of the root should be capped with a considerable thickness of gutta-percha. This should then be firmly pressed down upon the end of the root, and against the gum, using large-headed burnishers for the purpose. With a little firm pressure this would force the gum from the margins of the root without pain to the patient. The gutta-percha might be left on for two or three days, until the crown was ready for fixing. Then, previous to the application of the rubber dam, one or two applications of cocaine between the free margins of the gum and the root would enable the operator to push the rubber still further up on the root without pain to the patient; a thin spatula-shaped instrument should be used for this purpose. The method suggested by Mr. Coles would answer very well in certain cases, but as he only claimed that it would keep the parts fairly dry, and absolute dryness was essential to success in the majority of these cases, the number of cases to which it would be applicable would be limited. Mr. Hutchinson's method was practically the same as his own, except that he was in the habit of leaving the gum under pressure for a day or two, thereby obtaining greater exposure of the margin of the root.

In reply to Mr. Walter Coffin, he depended mainly upon the cement for retaining the pin, but the gold also assisted, as it was carried a certain distance down into the canals around the pivot. No doubt good results might be obtained by the use of amalgam, but the same scrupulous attention to details was essential in its use as with gold.

The PRESIDENT then offered the thanks of the Society to Messrs. Tomes, Field, Redman, Wilson, and other contributors of specimens and communications, and said he hoped all present would meet again at the next meeting on November 2nd, when Mr. Frederick Eve, F.R.C.S., Curator of the Museum of the Royal College of Surgeons, would read a paper on "Some Points in the Pathology of Cystic and Encysted Solid Tumours of the Jaws."

The Society then adjourned.

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